



THE IMPERIAL ENCYCLOPEDIA AND DICTIONARY

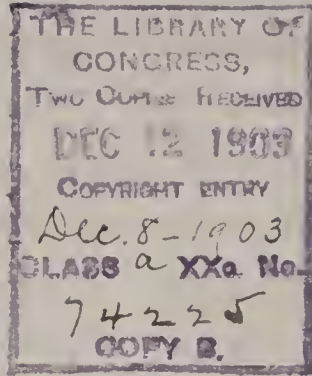
A LIBRARY OF UNIVERSAL
KNOWLEDGE AND AN UN-
ABRIDGED DICTIONARY OF
THE ENGLISH LANGUAGE
UNDER ONE ALPHABET

IN FORTY VOLUMES

VOLUME 39
VIRE—WIGTON

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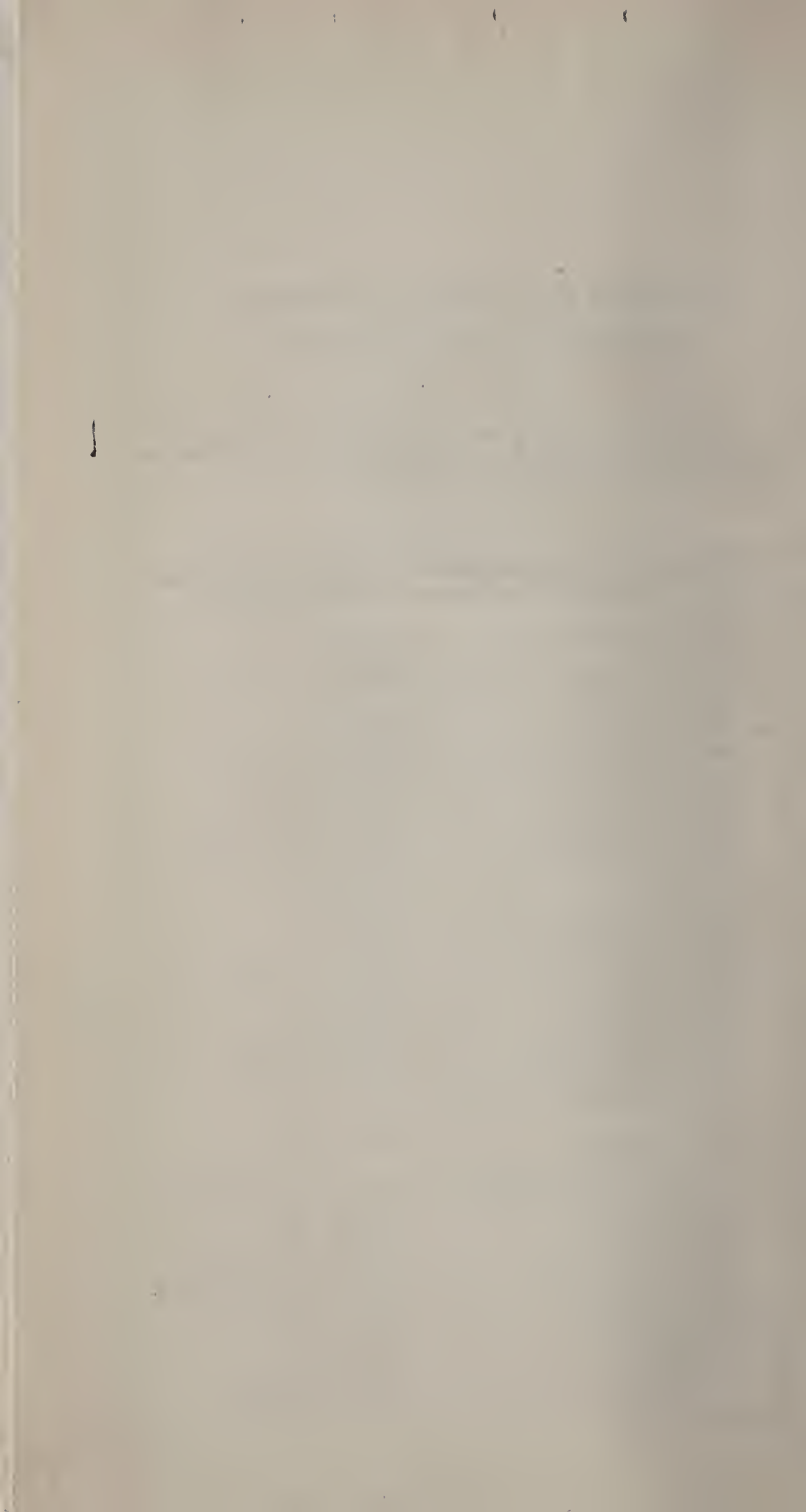
SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(·) is the mark dividing words respelt phonetically into syllables; ('), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
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<i>ā</i> ...	mate, fate, fail, aye.....	<i>māt, fāt, fāl, ā.</i>
<i>ă</i> ...	mat, fat.....	<i>măt, făt.</i>
<i>â</i> ...	far, calm, father.....	<i>fâr, kâm, fâ'thēr.</i>
<i>ă</i> ...	care, fair.....	<i>câr, fâr.</i>
<i>aw</i> ...	fall, laud, law.....	<i>fawl, lawd, law.</i>
<i>ē</i> ...	mete, meat, feet, free.....	<i>mēt, mêt, fêt, frē.</i>
<i>ě</i> ...	met, bed.....	<i>mět, běd.</i>
<i>é</i> ...	her, stir, heard, cur.....	<i>hēr, stēr, hērd, kēr.</i>
<i>ī</i> ...	pine, ply, height.....	<i>pīn, plī, hīt.</i>
<i>ĩ</i> ...	pin, nymph, ability.....	<i>pīn, nĩmf, ă-bĩl'ĩ-tĩ.</i>
<i>ō</i> ...	note, toll, soul.....	<i>nōt, tōl, sōl.</i>
<i>ǒ</i> ...	not, plot.....	<i>nōt, plōt.</i>
<i>ó</i> ...	move, smooth.....	<i>môv, smôth.</i>
<i>ō</i> ...	Goethe (similar to <i>e</i> in her)...	<i>gō'tēh.</i>
<i>ow</i> ...	noun, bough, cow.....	<i>noun, bow, korw.</i>
<i>oy</i> ...	boy, boil.....	<i>boy, boyl.</i>
<i>ū</i> ...	pure, dew, few.....	<i>pūr, dū, fū.</i>
<i>ũ</i> ...	bud, come, tough.....	<i>būd, kũm, tũf.</i>
<i>ú</i> ...	full, push, good.....	<i>fúl, púsh, gúd.</i>
<i>ü</i> ...	French plume, Scotch guid.....	<i>plüm, güd.</i>
<i>ch</i> ...	chair, match.....	<i>chär, mäch.</i>
<i>ch</i> ...	German buch, Heidelberg, Scotch loch (guttural).....	<i>bóch, hĩ'dél-běrch, löch.</i>
<i>g</i> ...	game, go, gun.....	<i>gām, gō, gũn.</i>
<i>j</i> ...	judge, gem, gin.....	<i>jűj, jēm, jĩn.</i>
<i>k</i> ...	king, cat, cot, cut.....	<i>kĩng, kăt, kōt, kűt.</i>
<i>s</i> ...	sit, scene, cell, city, cypress.....	<i>sīt, sēn, sěl, sīt'ĩ, sĩ'prēs.</i>
<i>sh</i> ...	shun, ambition.....	<i>shũn, ăm-bĩsh'ũn.</i>
<i>th</i> ...	thing, breath.....	<i>thĩng, brēth.</i>
<i>th</i> ...	though, breathe.....	<i>thō, brēth.</i>
<i>z</i> ...	zeal, maze, muse.....	<i>zēl, māz, mūz.</i>
<i>zh</i> ...	azure, vision.....	<i>ăzh'ēr, vűeh'ũn.</i>



ABBREVIATIONS USED IN THIS WORK.

a., or adj......adjective
A.B......Bachelor of Arts
abbr......abbreviation, abbreviated
abl. or abla.ablative
Abp......Archbishop
abt......about
Acad......Academy
acc. or ac.accusative
accom......accommodated, accommodation
act......active
A.D......in the year of our Lord [*Anno Domini*]
Adj......Adjutant
Adm......Admiral
adv. or ad.adverb
A. F......Anglo-French
Ag......Silver [*Argentum*]
agri......agriculture
A. L......Anglo-Latin
Al......Aluminium
Ala......Alabama
Alb......Albanian
alg......algebra
A.M......before noon [*ante meridiem*]
A.M......Master of Arts
Am......Amos
Amer......America, -n
anat......anatomy, anatomical
anc......ancient, anciently
A.N. M......in the year of the world [*Anno Mundi*]
anon......anonymous
antiq......antiquity, antiquities
aor......aorist, -ic
app......appendix
appar......apparently
Apr......April
Ar......Arabic
arch......architecture
archæol......archæology
arith......arithmetical
Ark......Arkansas
art......article
artil......artillery
AS......Anglo-Saxon
As......Arsenic
Assoc......Association
asst......assistant
astrol......astrology
astron......astronomy
attrib......attributive
atty......attorney
at. wt......atomic weight
Au......Gold [*Aurum*]

A.U.C......in the year of the building of the city (Rome) [*Anno Urbis conditæ*]
Aug......August
aug......augmentative
Aust......Austrian
A. V......authorized version [of Bible, 1611]
avoir......avoirdupois
B......Boron
B......Britannic
b......born
Ba......Barium
Bart......Baronet
Bav......Bavarian
bl.; bbl......barrel; barrels
B.C......before Christ
B.C.L......Bachelor of Civil Law
B.D......Bachelor of Divinity
bef......before
Belg......Belgic
Beng......Bengali
Bi......Bismuth
biog......biography, biographical
biol......biology
B.L......Bachelor of Laws
Bohem......Bohemian
bot......botany, botanical
Bp......Bishop
Br......Bromine
Braz......Brazilian
Bret......Breton
Brig......Brigadier
Brit......British, Britannica
bro......brother
Bulg......Bulgarian
bush......bushel, bushels
C......Carbon
c......century
Ca......Calcium
Cal......California
Camb......Cambridge
Can......Canada
Cant......Canterbury
cap......capital
Capt......Captain
Card......Cardinal
carp......carpentry
Cath......Catholic
caus......causative
cav......cavalry
Cd......Cadmium
Ce......Cerium
Celt......Celtic
cent......central
cf......compare [*confer*]
ch. or chh......church

ABBREVIATIONS.

Chal.....	Chaldee	diff.....	differe	ference
chap....	chapter	din.....	diminu	
chem.....	chemistry, chemical	dist....	district	
Chin.....	Chinese	distrib....	distribution	
Chron.....	Chronicles	div.....	division	
chron.....	chronology	doz.....	dozen	
Cl.....	Chlorine	Dr.....	Doctor	
Class.....	Classical [= Greek and Latin]	dr.....	dram, drams	
Co.....	Cobalt	dram.....	dramatic	
Co.....	Company	Dut. or D...	Dutch	
co.....	county	dwt.....	pennyweight	
cog.....	cognate [with]	dynam or		
Col.....	Colonel	dyn.....	dynamics	
Col.....	Colossians	E.....	Erbium	
Coll.....	College	E. or e....	East, -ern, -ward	
colloq.....	colloquial	E. or Eng.	English	
Colo.....	Colorado	Eccl.....	Ecclesiastes	
Com.....	Commodore	eccl. or	ecclesiastical [af-fairs]	
com.....	commerce, commercial	eccles....		
com.....	common	ed.....	edited, edition, editor	
comp.....	compare	e.g.....	for example [ex gratia]	
comp.....	composition, compound	E. Ind. or	East Indies, East Indian	
compar....	comparative	E. I....		
conch.....	conchology	elect.....	electricity	
cong.....	congress	Emp....	Emperor	
Congl.....	Congregational	Encyc.....	Encyclopedia	
conj.....	conjunction	Eng. or E.	English	
Conn or Ct.	Connecticut	engin.....	engineering	
contr.....	contraction, contracted	entom....	entomology	
Cop.....	Coptic	env. ext....	envoy extraordinary	
Cor.....	Corinthians	ep.....	epistle	
Corn.....	Cornish	Eph.....	Ephesians	
corr.....	corresponding	Episc.....	Episcopal	
Cr.....	Chromium	eq. or =...	equal, equals	
crystal.....	crystallography	equiv.....	equivalent	
Cs.....	Cæsium	esp.....	especially	
ct.....	cent	Est.....	Esther	
Ct. or Conn.	Connecticut	estab.....	established	
Cu.....	Copper [Cuprum]	Esthon....	Esthonian	
cwt.....	a hundred weight	etc.....	and others like [et cetera]	
Cyc.....	Cyclopedia	Eth.....	Ethiopic	
D.....	Didymium	ethnog....	ethnography	
D. or Dut.	Dutch	ethnol....	ethnology	
d.....	died	et seq.....	and the following [et sequentia]	
d. [l. s. d.]	penny, pence	etym.....	etymology	
Dan.....	Danish	Eur.....	European	
dat.....	dative	Ex.....	Exodus	
dau.....	daughter	exclam....	exclamation	
D. C.....	District of Columbia	Ezek.....	Ezekiel	
D.C.L.....	Doctor of Civil [or Common] Law	Ezr.....	Ezra	
D.D.....	Doctor of Divinity	F.....	Fluorine	
Dec.....	December	F. or Fahr.	Fahrenheit	
dec.....	declension	f. or fem..	feminine	
def.....	define, definition	F. or Fr....	French	
deg.....	degree, degrees	fa.....	father	
Del.....	Delaware	Fahr. or F.	Fahrenheit	
del.....	delegate, delegates	far.....	farriery	
dem.....	democratic	Fe.....	Iron [Ferrum]	
dep.....	deputy	Feb.....	February	
dep.....	deponent	fem or f..	feminine	
dept.....	department	fig.....	figure, figuratively	
deriv.....	derivation, derivative	Fin.....	Finnish	
Deut.....	Deuteronomy	F.—L.....	French from Latin	
dial.....	dialect, dialectal	Fla.....	Florida	
diam.....	diameter	Flem.....	Flemish	
Dic..	Dictionary	for.....	foreign	
		fort.....	fortification	
		Fr. or F....	French	
		fr.....	from	

ABBREVIATIONS.

freq.....frequentative
FrisFrisian
ft.....foot, feet
fut.....future
G. or Ger...German
G.....Glucinium
Ga.....Gallium
Ga.....Georgia
Gael.....Gaelic
GalGalatians
gal.....gallon
galv.....galvanism, galvanic
gard.....gardening
gen.....gender
Gen.....General
GenGenesis
gen.....genitive
Geno.....Genoese
geoggeography
geol.....geology
geom.....geometry
Ger.....German, Germany
Goth.....Gothic
Gov.....Governor
govt.....government
Gr.....Grand, Great
Gr.....Greek
gr.....grain, grains
gramgrammar
Gr. Brit...Great Britain
Gris.....Grisons
gungunnery
H.....Hegira
H.....Hydrogen
h.....hour, hours
Hab.....Habakkuk
Hag.....Haggai
H. B. M....His [or Her] Britan-
 nic Majesty
Heb.....Hebrew, Hebrews
her.....heraldry
herpet.....herpetology
Hg.....Mercury [*Hydrar-*
 gyrum]
hhd.....hogshead, hogsheads
Hind.....Hindustani, Hindu,
 or Hindi
hist.....history, historical
HonHonorable
hort.....horticulture
HosHosea
Hung.....Hungarian
Hydros...Hydrostatics
I.....Iodine
I.; Is.....Island; Islands
Icel.....Icelandic
ichth.....ichthyology
Ida.....Idaho
i.e......that is [*id est*]
Ill.....Illinois
illus.....illustration
impera or
 impr.....imperative
impers.....impersonal
impf or imp..imperfect
impf. p. or
 imp.....imperfect participle
improp.....improperly
In.....Indium
in.....inch, inches
incept.....inceptive
Ind.....India, Indian
Ind.....Indiana

ind.....indicative
indefindefinite
Indo-Eur...Indo-European
inf.....infantry
inf or infin..infinitive
instr.....instrument, -al
int.....interest
intens.....intensive
interj. or
 int.....interjection
interrog...interrogative pro-
 noun
intr. or
 intrans...intransitive
Io.....Iowa
Ir.....Iridium
Ir.....Irish
Iran.....Iranian
irr.....irregular, -ly
Is.....Isaiah
It.....Italian
Jan.....January
Jap.....Japanese
Jas.....James
Jer.....Jeremiah
Jo.....John
Josh.....Joshua
Jr.....Junior
JudgJudges
K.....Potassium [*Kalium*]
K.....Kings [in Bible]
K.....king
Kan.....Kansas
Kt.....Knight
Ky.....Kentucky
L.....Latin
Li.....Lithium
l. [l. s. d.], } pound, pounds
 or £..... } [sterling]
La.....Lanthanum
La.....Louisiana
Lam.....Lamentations
Lang.....Languedoc
lang... ..language
Lap.....Lapland
latlatitude
lb.; llb. or } pound; pounds
 lbs...... } [weight]
Let.....Lettish
LevLeviticus
LG.....Low German
L.H.D......Doctor of Polite Lit-
 erature
Lieut.....Lieutenant
Lim.....Limousin
Lin.....Linnæus, Linnæan
litliteral, -ly
litliterature
Lith.....Lithuanian
lithog.....lithograph, -y
LL.....Late Latin, Low
 Latin
LL.D......Doctor of Laws
long.....longitude
Luth.....Lutheran
M.....Middle
M.....Monsieur
m.mile, miles
m. or masc..masculine
M.A......Master of Arts
MaccMaccabees
mach... ..machinery
Mag.....Magazine

ABBREVIATIONS.

Maj.	Major	N. A., or	
Mal.	Malachi	N. Amer.	North America, -n
Mal.	Malay, Marican	nat.	natural
manuf.	manufacturing, manufacturers	naut.	nautical
Mar.	March	nav.	navigation, naval affairs
masc or m.	masculine	Nb.	Niobium
Mass.	Massachusetts	N. C. or	
math.	mathematics, mathematical	N. Car.	North Carolina
Matt.	Matthew	N. D.	North Dakota
M.D.	Doctor of Medicine	Neb.	Nebraska
MD.	Middle Dutch	neg.	negative
Md.	Maryland	Neh.	Nehemiah
ME.	Middle English, or Old English	N. Eng.	New England
Me.	Maine	neut or n.	neuter
mech.	mechanics, mechanical	Nev.	Nevada
med.	medicine, medical	N.Gr.	New Greek, Modern Greek
mem.	member	N. H.	New Hampshire
mensur.	mensuration	NHG.	New High German [German]
Messrs. or		Ni	Nickel
MM	Gentlemen, Sirs	N. J.	New Jersey
metal.	metallurgy	NL	New Latin, Modern Latin
metaph.	metaphysics, metaphysical	N. Mex.	New Mexico
meteor.	meteorology	N. T., or	
Meth.	Methodist	N. Test.	New Testament
Mex.	Mexican	N. Y.	New York [State]
Mg	Magnesium	nom.	nominative
M.Gr.	Middle Greek	Norm. F.	Norman French
MHG.	Middle High German	North. E.	Northern English
Mic.	Micah	Norw.	Norwegian, Norse
Mich	Michigan	Nov.	November
mid	middle [voice]	Num.	Numbers
Milan.	Milanese	numis.	numismatics
mid. L. or	Middle Latin, Medieval Latin	O.	Ohio
ML.		O.	Old
milit. or		O.	Oxygen
mil.	military [affairs]	Obad.	Obadiah
min	minute, minutes	obj.	objective
mineral.	mineralogy	obs. or †	obsolete
Minn	Minnesota	obsoles.	obsolescent
Min. Plen.	Minister Plenipotentiary	O.Bulg.	Old Bulgarian or Old Slavic
Miss.	Mississippi	Oct.	October
ML. or	Middle Latin, Medieval L.	Odontog.	odontography
MLG.	Middle Low German.	OE.	Old English
Mlle.	Mademoiselle	OF or	
Mme.	Madam	O. Fr.	Old French
Mn.	Manganese	OHG.	Old High German
Mo.	Missouri	Ont.	Ontario
Mo.	Molybdenum	opt	optics, optical
mod.	modern	Or.	Oregon
Mont	Montana	ord	order
Mr.	Master [Mister]	ord.	ordnance
Mrs.	Mistress [Missis]	org.	organic
MS.; MSS.	manuscript; manuscripts	orig.	original. -ly
Mt.	Mount, mountain	ornith.	ornithology
mus.	music	Os	Osmium
mus.doc.	Doctor of Music	OS.	Old Saxon
myth	mythology, mythological	O. T., or	
N.	Nitrogen	O. Test.	Old Testament
N. or n.	North, -ern, -ward	Oxf.	Oxford
n	noun	oz.	ounce, ounces
n or neut.	neuter	P.	Phosphorus
Na	Sodium [Natrium]	p.; pp.	page; pages
Nah.	Nahum	p., or part.	participle
		Pa. or Penn.	Pennsylvania
		paint	painting
		palæon.	palæontology
		parl	parliament
		pass.	passive

ABBREVIATIONS.

pathol or
 path.....pathology
 Pb.....Lead [*Plumbum*]
 Pd.....Palladium
 Penn or Pa. Pennsylvania
 perf.....perfect
 perh.perhaps
 Pers.....Persian, Persic
 pers.....person
 persp.....perspective
 pert.....pertaining [to]
 Pet.....Peter
 Pg. or Port. Portuguese
 phar.....pharmacy
 PH.D.....Doctor of Philoso-
 phy
 Phen.....Phenician
 Phil.....Philippians
 Philem.....Philemon
 philol.....philology, philologi-
 cal
 philos. { philosophy, philo-
 or phil... } sophical
 phonog.....phonography
 photog.....photography
 phren.....phrenology
 phys.....physics, physical
 physiol.....physiology, physi-
 ological
 Pied.....Piedmontese
 Pl.....Plate
 pl. or plu...plural
 Pl. D.....Platt Deutsch
 plupf.....pluperfect
 P.M.....afternoon [*post meri-
 diem*]
 pneum.....pneumatics
 P. O.....Post-office
 poet.....poetical
 Pol.....Polish
 pol econ...political economy
 polit.....politics, political
 pop.....population
 Port. or Pg. Portuguese
 poss.....possessive
 pp.....pages
 pp.....past participle, per-
 fect participle
 p. pr.....present participle
 Pr. or Prov. Provençal
 pref.....prefix
 prep.....preposition
 Pres.....President
 pres.....present
 Presb.....Presbyterian
 pret.....preterit
 prim.....primitive
 priv.....privative
 prob.....probably, probable
 Prof.....Professor
 pron.....pronoun
 pron.....pronunciation, pro-
 nounced
 prop.....properly
 pros.....prosody
 Prot.....Protestant
 Prov. or Pr. Provençal
 Prov.....Proverbs
 prov.....province, provincial
 Prov. Eng. Provincial English
 Prus.....Prussia, -n
 Ps.....Psalm, Psalms
 psychol....psychology

pt.....past tense
 pt.....pint
 Pt.....Platinum
 pub.....published, publisher,
 publication
 pwt.....pennyweight
 Q.....Quebec
 qt.....quart
 qtr.....quarter [weight]
 qu.....query
 q.v.....which see [*quod
 vide*]
 R.....Rhodium
 R.....River
 Rb.....Rubidium
 R. Cath....Roman Catholic
 rec. sec....recording secretary
 Ref.....Reformed
 refl.....reflex
 reg.....regular, -ly
 regt.....regiment
 rel. pro. or
 rel.....relative pronoun
 repr.....representing
 repub.....republican
 Rev.....Revelation
 Rev.....The Reverend
 Rev. V.....Revised Version
 rhet.....rhetoric, -al
 R. I.....Rhode Island
 R. N.....Royal Navy
 Rom.....Roman, Romans
 Rom.....Romanic or Ra-
 mance
 Rom. Cath. { Roman Catholic
 Ch. or R. } Church
 C. Ch... }
 r.r.....railroad
 Rt. Rev...Right Reverend
 Ru.....Ruthenium
 Russ.....Russian
 r.w.....railway
 S.....Saxon
 S.....Sulphur
 s.....second, seconds
 s. [l. s. d.]..shilling, shillings
 S. or s.....South, -eru, -ward
 S. A. or
 S. Amer..South America, -n
 Sam.....Samaritan
 Sam.....Samuel
 Sans, or
 Skr.....Sanskrit
 Sb.....Antimony [*Stibium*]
 s.c.....understand, supply,
 namely [*scilicet*]
 S. C. or
 S. Car....South Carolina
 Scand.....Scandinavian
 Scot.....Scotland, Scotch
 scr.....scruple, scruples
 Scrip.....Scripture [s], Scrip-
 tural
 sculp.....sculpture
 S. D.....South Dakota
 Se.....Selenium
 sec.....secretary
 sec.....section
 Sem.....Semitic
 Sep.....September
 Serv.....Servian
 Shaks.....Shakespeare
 Si.....Silicon

ABBREVIATIONS.

Sic.....	Sicilian	trigon.....	trigonometry
sing.....	singular	Turk.....	Turkish
sis.....	sister	typog.....	typography, typo-
Skr. or			graphical
Sans.....	Sanskrit	U.....	Uranium
Slav.....	Slavonic, Slavic	ult.....	ultimate, -ly
Sn....	Tin [<i>Stannum</i>]	Unit.....	Unitarian
Soc.....	Society	Univ.....	Universalist
Song Sol..	Song of Solomon	Univ.....	University
Sp.....	Spanish	U. Presb...	United Presbyterian
sp. gr.....	specific gravity	U. S... ..	United States
sq.....	square	U. S. A....	United States Army
Sr.....	Senior	U. S. N....	United States Navy
Sr.....	Strontium	Ut.....	Utah
.....	Saint	V.....	Vanadium
.....	street	v.....	verb
stat.....	statute	Va.....	Virginia
s.T.D.....	Doctor of Sacred	var.....	variant [word]
	Theology	var.....	variety of [species]
subj.....	subjunctive	Ven.....	Venerable
suf.....	suffix	Venet.....	Venetian
Su. Goth..	Suo-Gothic	vet....	veterinary
superl....	superlative	v. i. or	
Supp.....	Supplement	v. intr....	verb intransitive
Supt	Superintendent	vil.....	village
surg.....	surgery, surgical	viz.....	namely, to-wit [<i>vide-</i>
Surv.....	surveying		<i>licet</i>]
Sw.....	Swedish	v. n.....	verb neuter
Swab.....	Swabian	voc.....	vocative
sym.....	symbol	vol.....	volume
syn.....	synonym, -y	vols.....	volunteers
Syr.....	Syriac, Syrian	Vt.....	Vermont
t	town	v. tr.....	verb transitive
Ta... ..	Tantalum	W.....	Tungsten [<i>Wolfram</i>]
Tart.....	Tartar	W.	Welsh
Te.....	Tellurium	W. or w....	West, -ern, -ward
technol....	technology	Wal.....	Walachian
teleg.....	telegraphy	Wall.....	Walloon
Tenn.....	Tennessee	Wash.....	Washington
term.....	termination	Westph...	Westphalia, -n
terr.....	territory	W. Ind. }	West Indies, West
Teut.....	Teutonic	or W. I... }	Indian
Tex.....	Texas	Wis.....	Wisconsin
Th.....	Thorium	wt.....	weight
theat.....	theatrical	W. Va.....	West Virginia
theol.....	theology, theological	Wyo.	Wyoming
therap.....	therapeutics	Y.....	Yttrium
Thess.....	Thessalonians	yd.....	yard
Ti.....	Titanium	yr.....	year
Tim.....	Timothy	Zech.....	Zechariah
Tit.....	Titus	Zeph.	Zephaniah
Tl.....	Thallium	Zn.....	Zinc
toxicol....	toxicology	zool.....	zoology, zoological
tp.....	township	Zr.....	Zirconium
tr. or trans.	transitive		
transl.....	translation, trans-		
	lated		

See also ABBREVIATIONS: in Vol. I.

IMPERIAL ENCYCLOPEDIA AND DICTIONARY.

VIRE, n. *vēr*, or VIRETON, *vir'ě-tŭn* [OF. *vire*; Sp., Port., *vira*—said to be a contraction of Sp., Port., *vibora* (perhaps influenced by OF. *virer*, to turn)—from L. *vipera*, a viper]: a bolt for a cross-bow, feathered in such a way as to cause it to rotate in its flight.

VIRELAY, n. *vēr'ě-lā* [F. *virelai*—from *virer*, to turn; *lai*, a lay]: a short poem of two rimes only, common in Old French; also a succession of stanzas on two rimes, the rime of the last line of each stanza becoming the rime of the first couplet in the next.

VIREO, *vir'ě-ō* [L., greenfinch], or GREEN'LET: genus of small oscine passerine birds; familiar name of any bird belonging to the family *Vireonidæ*. The species all are American, and most of them occur within the limits of the United States.—Bell's V. (*V. belli*) was discovered by Audubon; its range is from Ill. w. and s. as far as Mexico; it is very small.—*V. atracapillus*, the Black-capped or Black-headed V., is very rare and is found in Texas and Mexico.—*V. barbatulus*, the Black-whiskered V., called from its notes 'whip-tom-kelly,' is seen in Florida and the W. Indies.—Other species are: Blue-headed (or Solitary) V.; Gray V. (*V. vicinior*); Hutton's V. (Cal. and Mexico); *V. pusillus*, or Least V. (Arizona); Philadelphia V. (e. N. America from Hudson's Bay to Guatemala); *V. gilvus*, the Warbling V. (e. N. America), an exquisite warbler—a small species, plainly colored; *V. noveboracensis*, the white-eyed V., with white iris, yellow tint about the face; very small: this is the species longest and best known in the e. states; habitat, e. United States and southward; warbles sweetly; often makes its nest of waste paper.

VIREON'IDÆ: family of American oscine passerine birds, of which *Vireo* (q.v.) is the typical genus; the greenlets. The other genera are *Cyclarhis*, *Hylophilus*, *Laetes*, *Neochloe*, and *Vireolanius*. The V. are all small birds, less than 7 in. long, and of a greenish color. They are mostly insectivorous, and live in woods and shrubberies.

VIRESCENCE, n. *vir-ěs'ěns* [L. *virescens* or *virescen'tem*, growing green; *virescērē*, to grow green—from *virērē*, to be green]: greenness; in bot., the act of growing green through the development of chlorophyl; the production of

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green in petals instead of the usual coloring matter.
VIRESCENT, a. *vīr-ēs'ěnt*, approaching a green hue.
VIRENT, a. *vī'rěnt*, green; fresh.

VIRGATE, a. *vēr'gāt*, or **VIR'GATED**, a. *-gā-těd* [L. *virga*, a rod]: in *bot.*, long and straight like a wand; slender, straight and erect, as a *virgate* stem. **VIR'GATE**, n. an old measure of land, varying at different times and in different districts from 15 to 30 or 40 acres; a yardland.
VIRGAL, a. *-gāl*, rod-like; made of twigs.

VIRGILIA, *vīr-jīl'ī-ā* [from name of L. poet *Virgil*] genus of leguminous trees, comprising only one species, *V. capensis*, the Cape V., native of the Cape of Good Hope. It attains a height of 15-30 ft.; has rose-purple flowers, pinnate leaves with small leaflets. It is cultivated as an ornamental tree. In Cape Colony the wood of V. is used for yokes, spars, etc.; but it is not durable, being liable to be attacked by worms. The Amer. yellow-wood tree, formerly regarded as a species of V., is now referred to *Cladastris*, a genus native in Ky. and Tenn.

VIRGILIAN, a. *vēr-jīl'ī-ăn*: pertaining to the Roman poet Virgil, or to his style.

VIRGIL, *vēr'jīl* (more accurately and in full, **VERGILIUS MARO**, *vēr-jīl'ī-ūs mār'ō*, **PUBLIUS**): next to Homer, the greatest epic poet of antiquity: B.C. 70, Oct. 19—B.C. 19, Sep. 21; b., during the consulship of Crassus and Pompey, at Andes, a village near Mantua, Italy. It is probable that his father was proprietor of a small estate farmed by himself. V. was liberally educated, and is believed to have studied successively at Cremona and Mediolanum (Milan). In philosophy he was instructed by Syron, an Epicurean; and one of his fellow-students was that Varus to whom his 6th Eclogue is dedicated. Greek he learned at Neapolis (Naples) from the grammarian Parthenius. If we are correct in supposing that, in the 1st Eclogue, V. relates his own experience in the person of Tityrus, he first visited Rome B.C. 41, in his 30th year, for the purpose of claiming his lands which had been occupied by the soldiery of Octavianus, at the close of the war against the republicans. At Rome he was introduced to Octavianus, through the influence of Pollio, or of some other patron, and further formed the acquaintance of his great protector, Mæcenas. He continued to compose his Eclogues—the 10th and last of which is dedicated to Gallus, and referred to the poet's 33d or 34th year. At the instance of Mæcenas, he commenced his *Georgics* in his 34th year, according to the grammarians, who also assign seven years as the time spent by him in composing the work, principally at Naples. The *Æneid* was his last performance, and must have occupied many of the latter years of his life. He went B.C. 19 to Greece, where he meant to subject his great poem to a thorough process of revision and refinement; and his voyage to Athens was made by Horace the occasion of the ode (Book I. 3) commencing with 'Sic te diva potens Cypri.' At Athens, V. met Augustus on his triumphal return from the East, and

the poet was induced to go back to Rome in his company. He had only reached Megara, however, when he was seized with illness, which became worse on his voyage to Italy. On landing at Brundisium, or, according to another account, at Tarentum, he lacked strength for the fatigue of travelling; and after lingering a few days, he died, in his 52d year. In compliance with his dying wish, his body was removed to Naples, and buried at the second milestone from that city, on the Puteolan Way. Pliny the Elder and Aulus Gellius are among the writers who say that on his death-bed V. desired his epic poem to be burned, rather than that it should see the light in its imperfect state; but that the injunctions of Augustus to his executors—or, according to others, the interposition of his friends Tucca and Varius, who persuaded him to bequeath it to them on the understanding that it should remain unaltered—were the means of preserving it. This incident is quite in keeping with all that we know of V.'s modesty. The liberality of his patrons had endowed him with considerable property. He had a house on the Esquiline, near the gardens of Mæcenas, where he lived in an elegant simplicity, while he allowed the public free access to his excellent library. He was tall of stature, dark of complexion, and had the appearance of a farmer. The *Eclogæ* or *Bucolicæ* were confessedly imitations and in great part translations of the great Sicilian pastoral poet Theocritus: they are written in graceful and polished verse, and it is no small praise to say that the *Bucolics* are worthy of a place by the side of the originals. V's most finished poem is the *Georgicæ*, which treats of subjects connected with the cultivation of the soil. Though the fancy and imagination of the poet have free play, they are not permitted to interfere with the serious purpose of the composition—viz., to convey practical instruction on the art of husbandry. The poet was well adapted for the task by his own pursuits, and by his love for a rural life; and he fitted himself still further by diligent study of all the literature of the subject, both Greek and Latin. The *Georgics* are divided into 4 books, treating respectively of tillage, culture of trees and fruits, breeding of domestic animals, and bee-keeping.—V's *Æneid* shows rather what he might have been than what he was as an epic poet. Unfinished as it is, however, its merits have always secured V. a place in the front rank of epic writers; while, more than any similar work of antiquity, it has furnished a model to the epic and narrative poets of modern Italy. It is monumental, not as a representation of character or life, nor as a poetic rendering of history, but as a grand idealization of imperial Rome, the spirit of whose dim prehistoric traditions it sketches in impressive outline. Its scenes centre around its hero *Æneas* (q.v.).—V. has been edited and translated by scholars of nearly every country and period. The best Eng. transl. is that of the *Æneid* by William Morris (1875), which is on the whole superior to Dryden's, previously unequalled. Conington's *Æneid*

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is in some features highly successful. The best editions are those of Heyne, Wagner, Forbiger, and Conington.

VIRGIL, 'the Magician,' is the character in which the great Roman poet PUBLIUS VERGILIUS MARO presented himself to the popular imagination of the middle ages. The origin of this singular delusion may be thus explained: From a very early period—almost from the age in which he flourished—V. was acknowledged the prince of Latin poets. His poems threw all others into the shade; and this not so much because they exhibited a finer and more original genius, as because their style was perfect, the subject of his *magnum opus* thoroughly national, and his immense historical and antiquarian lore devoted to the glorification of the Roman people. From him the grammarians selected the examples of their rules, and the rhetoricians material for their themes and declamations. Very soon the idea sprang up that in his verses there lay hidden a peculiar wisdom and a mystic meaning; and as early as the 3d and 4th c., even Christian authors (e.g., Minutius Felix, Lactantius, Augustine) show for him a reverential regard which misled them to use him for theological purposes. Thus they sought to prove the beginning of the 4th Eclogue a Messianic prediction, and would have it that V. foresaw the day of Christ. This view became so prevalent that V. and the Sibyl (q.v.) were actually introduced into the liturgy of the church, with the Messianic prophecies of the Old Testament; and in the 'mysteries' of the middle ages they are frequently cited as testifying to a coming Messiah. Later, in the first ages of polemical theology, biblical controversialists quoted the verses of V. in confirmation of their views; and still later, some of the scholastics endeavored to give a 'moral' significance to the whole *Aeneid*; and an epitome of sacred history even was manufactured out of its contents (see CENTO). For another misuse of the verse of V., see SORTES BIBLICÆ. Ultimately, as may be seen from the *Divina Commedia* of Dante, V. came to be considered as a representative of pure enlightened reason; a rare genius standing midway between paganism and Christianity.—Soon after V.'s death, statues were erected to his memory, even in the domestic chapels of the pagan emperors; the anniversary of his birth was held sacred; pregnant women and poets made pilgrimages to his tomb, and hence it became inevitable that all sorts of myths should spring up and attach themselves to his history; but the predominant conception in the middle ages was that of a wise, pure, and patriotic teacher, endowed with magic power and lore—quite a different kind of being from the evil and dreaded 'sorcerer' of popular fancy. But, strangely, it was not first from the Italians, but from foreigners, that the Virgilian myths obtained literary consideration. The oldest known document bearing on the subject is the *Otia Imperialia* of the Englishman Gervase of Tilbury, who collected his stories from the mouths of the Neapolitan populace. A fuller account is in the *Chronicle* of Arnold of Lübeck, who got his information from Conrad, Bp. of Hildesheim,

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chancellor of Emperor Henry VI. These were followed by two contemporaries—Helinandus and the Eng. monk Alexander Neckham—and from these sources the later Virgilian myth-mongers have borrowed. Particular stories and allusions are scattered through the literature of the middle ages after the 13th c. The first complete collection of the Virgilian myths was the French ‘people’s book,’ *Faictz Mareueilleux de Virgille*, pub. Paris, in the beginning of the 16th c., transl. soon afterward into Dutch and English. Even the distant Icelanders had heard of the great magician, and there still exists in MS. an Icelandic *Virgilius-Saga*.—See Milberg, *Memorabilia Vergiliana* (1867); Comparetti, *Virgilio nel Medio Ævo* (1872).

VIRGIN, n. *vér’jĭn* [L. *virgo* or *virgĭnem*, a maid—probably from *virĕrĕ*, to bloom, to be fresh: It. *vergine*: F. *vierge*]: a woman who has had no carnal knowledge of man; a chaste and unpolluted maiden; a maid; also, a man who has preserved his chastity (Rev. xiv, 22): **ADJ.** modest; chaste; pure; untouched; fresh; new: **V.** in *OE.*, to play the virgin. **VIR’GINAL**, n. *-jĭn-ăl* [F.—L.]: an ancient keyed musical instrument, so named from being used by maidens or virgins: in form it resembled a small pianoforte, but had no legs; it had a compass of four octaves, furnished with a quill and jack like those of the spinet, and a single string to each note: **ADJ.** in *OE.*, pertaining to a virgin; maidenly: **V.** in *OE.*, to strike as on the virginal; to pat. **VIR’GINHOOD**, n. *-hŭd*, virginity. **VIRGINITY**, n. *vér-jĭn’-ĭ-tĭ* [F. *virginité*—from L. *virgĭnĭtas*]: maidenhood; state of having had no sexual intercourse with man; virgin purity. **VIRGO**, n. *vér’gō* [L.]: one of the 12 signs of the zodiac, which the sun enters about Aug. 23, and which is represented by the figure of a clothed winged woman, with a spike of grain in her left hand. **VIRGINIA**, n. *vér-jĭn’ĭ-a*, one of the asteroids: a kind of tobacco grown and manufactured in *Virginia*. **VIRGIN HONEY**, honey nearly white in color.

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VIRGINIA, *ver-jin'i-a*: state; one of the 13 original states in the American Union; till 1863, June 19, including the present state of W. Va.; popularly known as the 'Old Dominion,' also as the 'mother of presidents,' named in honor of Elizabeth, the Virgin Queen.

Location and Area.—V. is in lat. $36^{\circ} 31'$ — $39^{\circ} 27'$ n., long. $75^{\circ} 13'$ — $83^{\circ} 37'$ w.; bounded n. and n.e. by Md., e. and s.e. by the Atlantic Ocean, s. by N. C. and Tenn., w. and n.w. by Ky. and W. Va.; extreme breadth e. to w. 425 m., extreme length n. to s. 205 m.; land surface 40,125 sq. m., water surface 2,325 sq. m., gross area 42,450 sq. m. (27,168,000 acres); coast-line about 120 m.; cap. Richmond.

Topography.—There are 6 natural divisions of terr., belts extending nearly n.e. to s.w., which are, in their order from the ocean: (1) the Tidewater country, (2) Middle V., (3) the Piedmont section, (4) the Blue Ridge country, (5) the Great Valley of V., (6) the Appalachian country. The Tidewater country is the e. and s.e. part of the state; is an irregular quadrilateral in shape, averaging 114 m. n. to s. and 90 m. e. to w.; is divided into 9 principal and seven minor peninsulas; and rises in three successive terraces to a height of 150 ft. Middle V. forms a right-angled triangle, 120 m., 174 m., and 216 m.; is a moderately undulating plain; reaches a height above tide water of 500 ft. in the n.w.; and shows both the Triassic and the Eozoic formations. The Piedmont section averages 25 m. wide by 244 m. long; extends from the Md. line s.w. to the N. C. line; and has an elevation at the foot of the Blue Ridge Mts. of 600–1,200 ft. This is a very picturesque region, with broken mountain ranges, isolated and connected knobs, valleys, 'coves,' water-gaps, and an abundance of running water. The Blue Ridge country is 310 m. long; expands in its s.w. part into a plateau of 1,230 sq. m.; and, with a general mountain elevation of 1,460 ft., shows Rockfish Gap, 1,996 ft., Mt. Marshall, 3,369 ft., the Peaks of Otter, 3,993 ft., and the Balsam Mountain, 5,700 ft. The Great Valley of V. extends from the Potomac to the Tenn. line, or more than 330 m.; of which 305 m. are in V., and the remainder in W. Va.; is bordered e. by the Blue Ridge, and w. by the Kittatinny or North Mts.; and is really 5 continuous valleys—viz., the Shenandoah, 136 m. long, the James river, 50 m., the Roanoke river, 38 m., the Kanawha or New river, 54 m., and the Holston or Tennessee river, 52 m. The Appalachian country is traversed its whole length by the Appalachian or Alleghany system; comprises a series of narrow, parallel valleys, extending n.e. to s.w., separated from each other by equally narrow and parallel mountain ranges; is an irregular belt 260 m. long and 10–50 m. wide; and is noted as a grazing country.—There are two systems of inland waters—the Atlantic, whose waters drain six-sevenths of the state, and the Ohio, whose waters drain the other seventh of the state and reach the Ohio river either directly or by the Tenn and Big Sandy rivers. Nearly every part of the state is well watered, and the rivers flow in

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every direction. The principal rivers are the Potomac, navigable for 110 m. from its entrance into Chesapeake Bay, 65 m. from the ocean, with the Shenandoah and South Branch as largest tributaries; the Rappahannock, navigable to Fredericksburg, 92 m. from its mouth at the bay, 40 m. from the ocean; the York, reaching more than 40 m. from the bay to the junction of its branches, the Pamunkey and the Mattaponi, both navigable for many m. by light-draught vessels; the James, navigable to Richmond, and, with its numerous tributaries, draining more of the state than any other river; the Kanawha, which rises in N. C., flows through V. and W. Va., and empties into the Ohio; and the Holston and Clinch, which drain the s.w. part of the state, and empty into the Tennessee river.—The soil in the Tidewater country is alluvial, with rich loam in the second terrace, and level and poor land in the ridge region; in Middle V. it is generally fertile and easily worked, and especially rich in the bottom lands of the streams; in the Piedmont section Epidotic rocks prevail, yielding red, gray, and yellow soils; in the Blue Ridge country the peculiarities of the Piedmont section are found, besides an abundance of greenstone rock; in the Great Valley the greater part is a stiff, clayey loam, with some slaty belts containing decomposed aluminous rocks; and in the Appalachian country there are belts of sandstone that are very poor, and belts of limestone and shale that are very rich, with alluvial lands along its many streams.

Climate.—The climate is healthful, with mean annual temperature for the state of 56°. for the Tidewater country 58°, for the Middle and Piedmont 35°-60°, and for the Great Valley 54°; average mean for the state in Jan. 42°, in July 78°; mean annual rainfall for the state 40-45 inches.

Geology.—The formations, in the order in which they succeed each other in the natural divisions, are: *Tidewater*, Quaternary, and Upper, Middle, and Lower Tertiary; *Middle*, Triassic and Jurassic. Azoic and Granitic; *Piedmont*, Azoic, Epidotic; *Blue Ridge*, Azoic and Cambrian; *Great Valley*, Cambrian and Silurian; and the *Appalachian*, Sub-carboniferous and Devonian, Silurian, Devonian and Sub-carboniferous, and Great Carboniferous. The economic properties are bituminous coal, iron ore, salt, limestones, sand and free stones, marble, slate, brick clay, and marl in the Appalachian country; lime, sand, and free stones, lead, zinc, kaolin, semi-anthracite coal, marl, marble, brick and fire clays in the Great Valley; copper, green, sand, and free stones, various iron ores, glass sand, and manganese in the Blue Ridge country; granitic building stones, marbles, several varieties of iron ore, brick and fire clays, and lead in the Piedmont section; brown stone, soapstone, marble, slate, granite, gold, silver, copper, bituminous coal, and various iron ores in Middle V.; and marls, greensand, choice clays, and sands and shell-limestones for building purposes in the Tidewater country. The principal forest products are the widely known V. pine, oak, cedar, locust, cypress, hickory, tulip poplar, black

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walnut, chestnut, birch, beech, and sycamore among trees; principal fruit products are blackberries, whortleberries, cranberries, strawberries, dewberries, serviceberries, thorn and crab apples, wild plums and cherries, haws, and persimmons; also a large variety of nuts.

Zoology.—V. has ample resources in animal food. Wild deer and black bear are found in nearly all sections, and there is an abundance of partridges, pheasants, wild turkeys, pigeons, and canvas-back, red-head, mallard, bald face, and other ducks. Oyster-culture in Chesapeake Bay is a large, important, and rapidly increasing industry. Birds of song and of plumage are very numerous and in large variety. The red fox, panther, wild cat, wolf, racoon, lynx, ground-hog, opossum, rabbit, and squirrel are plentiful.

Agriculture.—In 1891 the principal cereal productions were: corn 39,486,000 bu., 2,672,054 acres, \$21,852,057; oats 6,617,000 bu., 618,404 acres, \$2,712,938; and wheat 7,651,000 bu., 850,073 acres, \$7,650,657. The farm animals 1892 comprised 246,196 horses, value \$18,407,152; 37,173 mules, \$3,319,391; 280,252 milch-cows, \$6,235,607; 419,523 oxen and other cattle, \$7,233,456; 449,009 sheep, \$1,370,016; and 978,966 swine, \$3,596,722—total head 2,411,119, value \$40,162,344. In 1900 there were 167,886 farms, covering 19,907,883 acres, of which 10,094,805 acres were improved and 9,813,078 acres unimproved, and all farm property, includ. buildings, implements and machinery, and live stock, was valued at \$323,515,977. In 1902 the production of the principal crops was: corn 41,345,656 bu.; wheat 3,635,494 bu.; oats 3,886,295 bu.; tobacco 136,769,250 lbs.; potatoes 3,789,825 bu.

Manufactures.—V. had (1880) 5,710 manufacturing establishments, employing 40,184 hands, using a capital of \$26,968,990, paying in wages \$7,425,261, using materials valued at \$32,883,933, yielding products valued at \$51,780,992.

In 1889 there were 8,656 establishments, employing 67,200 hands, using capital \$77,585,000, and yielding products valued at \$92,875,000. There were 14 cotton-mills with 99,889 spindles and 2,754 looms; against (1880) 8 mills, 44,340 spindles, and 1,322 looms. The lumber industry, which has 13,000,000 acres of forest to draw upon, had 196 saw-mills, 16 shingle-mills, 94 planing-mills, 19 logging railroads, and 30 dry-kiln plants; and the mills had a total sawing capacity of 2,419,000 ft. per day. The manufacture of distilled spirits yielded the federal govt. in internal-revenue tax \$269,123; tobacco \$3,195,382; fermented liquors \$49,607; and oleomargarine \$104; penalties added made total receipts \$3,516,158. In 1900 there were reported 8,248 manufacturing establishments, employing \$103,670,988 capital and 72,702 persons, paying \$22,445,720 for wages and \$74,851,757 for materials used, and yielding products valued at \$132,172,910. Among the leading industries (1900), according to the value of their products, were the manufacture of tobacco \$21,278,266; lumber and timber products \$12,137,177; flouring and grist mill products \$12,687,267; iron and steel \$8,-

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341,888; foundry and machine shop products \$4,716,920; leather \$4,716,920; lumber, planing mill products \$2,686,898; and fertilizers \$3,415,850.

Mines and Quarries.—In 1880 V. yielded 43,079 short tons of bituminous coal, value \$99,802, and 2,817 short tons of anthracite coal, value \$8,290; 1888 the bituminous yield was 1,073,000 short tons, value \$1,073,000; and 1901 it was 2,725,873 short tons, value \$2,353,989. Almost all of the coal in V. is bituminous, and some of the finest grades of steam, coking and gas coal are found. Coal mining (1890) had a capital investment of \$1,055,516, employed 1,555 hands, paid \$621,266 wages, and had \$682,408 total expenses.

In 1890 there were reported 11 quarries of limestone, which yielded 471,505 cubic ft. for building purposes (\$19,520); 178,480 bbls. (200 lbs.) of lime (\$83,667); 15,000 tons (2,000 lbs.) of stone for burning into lime (\$7,500); 78,756 tons of flux for furnaces (\$48,146); and 7,560 cubic ft. for street-work (\$190). In 1901 the limestone statistics of V. were combined with those of W. Va., the total value of the production for the year being \$986,177.

In production of manganese ores V. ranked (1900) first, the product being 4,275 long tons. The total production for the years 1880-1901 was 188,026 long tons, more than $\frac{1}{2}$ of the total production of U.S. during the same period.

Iron ore statistics of V. were, combined (1890) with those of W. Va., the total showing a product of 511,255 long tons, value \$935,290, and in 1901 a product of \$925,394. In production of pig-iron V. ranked 17th (1880), with 31 furnace stacks and 17,906 long tons product; and 5th (1901) with 448,662 long tons product.

In granite V. ranked 5th (1880) with a product valued at \$331,928, and 14th (1890) with a product valued at \$332,548. The industry had \$446,650 capital investment, 13 quarries, and 1,703,206 cubic ft. product. In 1901 the value of the granite production was \$275,701.

Commerce.—In 1880 V. had 89 steam-vessels, 6,251.02 tonnage, \$494,400 value; 1,061 sailing-vessels, 26,638.28 tonnage, \$665,950 value; 57 canal-boats, 3,591 tonnage, \$31,350 value, 38 barges, 3,640.50 tonnage, \$11,100 value; and 146 flats, 1,500 tonnage, \$10,500 value. In the fiscal year ending 1891, June 30, there were licensed, enrolled and registered in the U. S. customs-houses in V., 1,333 vessels of 47,705.32 tons, of which 1,208 of 33,381 tons were sailing-vessels, 112 of 13,601.98 tons were steam-vessels, and 13 of 722.10 tons were barges. The imports of merchandise at the ports of entry and U. S. customs districts, Alexandria, Newport News, Norfolk and Portsmouth, and Richmond, aggregated \$185,955; domestic exports \$36,262,658; foreign exports \$100. Of the total imports, \$39,656 were dutiable; \$142,786 non-dutiable; \$160,881 were imported direct from foreign countries; \$181,465 for immediate consumption; \$41,458 were brought in American steam-vessels; \$69,352 in American sailing-vessels; \$61,442 in foreign steam-vessels; and \$10,180

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in foreign sailing-vessels. The largest amount of domestic exports went through the customs district of Norfolk and Portsmouth, \$16,475,752, with Newport News second, \$10,961,744, and Richmond third, \$8,825,162. Of the total domestic exports, \$1,560,048 went in American steam-vessels. During the 12 months ending 1903, June 30, the val. of imports of merchandise at Alexandria was \$6,890; at Newport News, \$4,298,799; at Norfolk and Portsmouth \$597,744; at Petersburg \$121,153; at Richmond \$165,610; value merchandise exported from Newport News \$25,508,391; Richmond, \$2,385; Norfolk and Portsmouth \$8,757,499; also provisions, including cattle and hogs, \$558,929, and cotton \$1,744,743.

Railroads and Telegraph.—The railroad mileage of V. was (1860) 1,379; (1880) 2,693; (1891) 3,176. In the latter year there were 42 companies in operation, which had \$33,118,197 invested in roadway and track; \$1,709,902 in depots, grounds, and machine-shops; \$1,583,468 in other real estate; total value of railroad property \$48,034,191. In 1901 the total railroad mileage of V. was 3,812, 17 m. of which were built during the preceding year. There were (1891) 16 telegraph and telephone companies, with 3,584 m. of line and 14,989½ m. of wire, and property valued at \$294,499.

Religion.—The Bapt. is the strongest denomination in the state, and 1892 reported 23 white assocs., with 438 ministers, 819 churches, 93,681 members, 736 Sunday schools, 7,606 officers and teachers, 59,396 pupils, \$1,853,375 in church property, and \$427,651.85 in aggregate contributions; and 22 colored assocs., with 650 ministers, 1,062 churches, 208,016 members, 402 Sunday schools, 2,162 officers and teachers, 23,389 pupils, \$390,043 in church property, and \$45,284.59 in aggregate contributions—total, 45 assocs., 1,088 ministers, 1,881 churches, 301,697 members, 1,138 Sunday schools, 9,768 officers and teachers, 82,785 pupils, \$2,243,418 in church property, and \$472,936.44 in aggregate contributions. The State Mission Board employed 85 missionaries, who in the previous year had supplied 222 stations, preached 6,369 sermons, organized 50 Sunday schools and 14 churches, and built 19 new churches and completed 12 others. The Sunday-school and Bible Board employed one supt. and 32 colporteurs, who preached 689 sermons, made 752 addresses, and organized 51 Sunday schools and 6 churches.

The Presb. Church in the U. S. reported 1892: synod of V., 10 presbyteries, 238 ministers, 391 churches, 32,779 members, 3,144 Sunday-school officers and teachers, 26,179 pupils, \$135,720 paid pastors' salaries, and \$108,725 contributions for general purposes and \$24,695 for miscellaneous purposes.

The Prot. Episc. Church reported 1892: diocese of V. (organized 1785)—comprising the whole state—1 bp., 157 clergy, 149 parishes and missions, 18,635 communicants, 1,767 Sunday-school officers and teachers, 14,205 pupils, \$310,861 contributions, and institutions: Theol. Seminary of the Diocese of V., at Alexandria; Episc. High School

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for Boys, Alexandria; V. Female Institute, Staunton; Bp. Payne Divinity and Industrial School, Petersburg; and a Church Home, Richmond.

The Rom. Cath. Church reported 1892: the diocese of Richmond (established 1821)—comprising e. V. and the valley formed by the Alleghany and Blue Ridge Mountains s. as far as Monroe co., leaving the cos. w. as part of the diocese of Wheeling—1 bp., 30 priests, 41 churches, 20 chapels and stations, 5 academies, 32 parochial schools, 2,000 pupils, estimated Rom. Cath. pop. 15,000; and institutions: 2 convents, St. Joseph's Female Orphan Asylum, Richmond; St. Sophia's Home for Old People, Richmond; St. Mary's Orphan Asylum, Norfolk; and St. Vincent's Hospital, Norfolk. The diocese of Wheeling (established 1850) comprised all of W. Va. excepting 8 cos. in the diocese of Richmond, and the part of V. w. of Patrick, Franklin, and Roanoke cos. It had 1 bp., 35 priests, 64 churches, 48 chapels and stations, 1 college, 6 academies, 14 parochial schools, 1,800 pupils, estimated Rom. Cath. pop. 20,000, and 3 charitable institutions in Wheeling. The diocese of Richmond, with an estimated colored pop. of 700,000, had 1 church, 2 priests, and 8 parochial schools for colored people, with 401 parochial pupils, and 550 professed colored Rom. Catholics.

The Luth. United Synod in the South reported 1890: 145 organizations, 124 churches, 16 halls, 11,196 members, and church property valued at \$314,200.

The Meth. Episc. Church reported 1892: the Va. conference, 4 districts, 92 local and 45 travelling preachers, 129 churches, 8,886 members, \$118,700 in church property, 20 parsonages, \$18,475 value, 134 Sunday schools, 1,181 officers and teachers, 6,459 pupils, and \$11,249 contributions for ministerial support.

The Conservative branch of the Brethren or Dunkards reported 1890: 42 organizations, 86 churches, 8 halls, 6,654 members, and church property valued at \$73,523.

The Christian Church South reported 1890: 38 organizations, 4,380 members, and church property valued at \$57,225.

The Ref. Church reported 1890: 20 organizations, 21 churches, 1,819 members, and church property valued at \$44,800.

The African Meth. Episc. Church reported 1890: 67 organizations, 102 churches, 12,314 members, and church property valued at \$187,245.

At the 10th international Sunday-school convention, at Denver, 1902, June 26-30, there were reported in V. 4,800 Sunday-schools, 55,400 officers and teachers, 330,000 scholars, total members 385,400.

Education.—In 1880 V. had 555,807 children of school age (5-21 years), of whom 220,733 were enrolled in the public schools, and 129,006 were in average daily attendance. The expenditures, including \$716,153 for teachers' salaries, were \$889,862. There were 8 colleges and universities, with 68 instructors and 831 students. In the school year 1888-9 there were 217,776 white children and

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119,172 colored (336,948) enrolled, of whom 129 907 white and 65,618 colored (195,525) were in average daily attendance; 5,268 schools for white children and 2,142 for colored (7,410); and 6,341 school-houses. There were 2,294 white male teachers and 3,178 white female (5,472), and 964 colored male and 987 colored female (1,951)—total teachers 7,423. The expenditures for current purposes were \$1,431,388, for permanent improvements \$189,421—total \$1,620,809. In 1902 there were 358,825 pupils enrolled in the public schools, 203,136 of whom were in average daily attendance. There were 3 public normal schools, with 26 instructors and 1,775 pupils, which combined had 27,000 vols. in the library, \$1,030,000 in grounds and buildings, and \$221,339 total income. These schools were the State Female Normal School, Farmville; Virginia Normal and Coll. Inst., Petersburg (colored); and the Hampton Normal and Agricultural Institute (q.v.).

Of schools for secondary instruction there were (1901) for *boys*: Abingdon Acad., Abingdon, with 62 pupils and \$5,000 in grounds and buildings; Episc. High School, Alexandria, 7 instructors, 105 pupils and \$30,000 in grounds and buildings; Potomac Acad., Alexandria, 3 instructors, 22 pupils and \$5,200 in grounds and buildings; Clay Hill Acad., Millwood, 2 instructors, 31 pupils, \$15,000 in grounds and bldgs.; Seven Islands School, Arvonnia, \$5,000 in grounds and bldgs.; High School, Bellevue, 3 instructors, 43 pupils, 2,300 vols. in library, and \$23,000 in grounds and buildings; Classical and Milit. Acad., Bethel Acad., 7 instructors, 60 pupils, \$25,000 in grounds and buildings; University School, Charlottesville, 2 instructors, 27 pupils; Core Acad., Coresville, 2 instructors, 12 pupils, and \$500 in grounds and building; Danville Milit., Danville, 6 instructors, 85 pupils, 200 vols. in library, and \$40,000 in grounds and buildings; Cleveland High School, Hume, 1 instructor, 50 pupils, and \$5,000 in grounds and buildings; Hampton Road Milit. Acad., 2 instructors, 60 pupils, and \$150,000 in grounds and buildings; Norfolk Acad., Norfolk, 4 instructors, 143 pupils, and \$75,000 in grounds and buildings; St. Mary's Male Acad., Norfolk, 5 instructors, 29 pupils, and 298 vols. in library; Staunton Mil. Acad., 5 instructors, 25 pupils, and \$20,000 in grounds and buildings; Suffolk Institute, 1 instructor, 9 pupils, and \$5,500 in grounds and buildings; and the Fishburn School, Waynesborough, 4 instructors, 40 pupils, and \$10,000 in grounds and buildings; for *girls*: Academy of the Visitation, Abingdon, 3 instructors, 23 pupils, and \$5,000 in grounds and buildings; Ryland Inst., Berkley; Randolph-Macon Inst., 9 instructors, 107 pupils, and \$40,000 in grounds and buildings; Hampton College, Hampton, 5 instructors, 50 pupils; Leache-Wood Seminary, Norfolk, 6 instructors, 80 pupils, and \$30,000 in grounds and buildings; The Phillips and West School for Girls, Norfolk, 6 instructors, 67 pupils and \$7,000 in grounds and buildings; Academy of the Visitation, Richmond, 3 instructors and 50 pupils; Kleinberg High School, Schuyler, 2 instructors, 20 pupils and \$5,000 in grounds and buildings; The

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Mary Baldwin Seminary, Staunton, 3 instructors, 220 pupils and \$175,000 in grounds and buildings; Virginia Female Institute, Staunton, 7 instructors, 75 pupils; Nansemond Seminary, Suffolk College, Fauquier Institute, West Point Female Seminary, and South Side Female Institute; and for *both sexes*: Shenandoah Institute, Dayton, 9 instructors, 165 pupils; Herndon Sem., Herndon; Gold's School, Berryville, 4 instructors, 42 pupils; Norfolk Mission Coll., 6 instructors, 700 pupils, and \$70,000 in grounds and buildings; Bon Air School, Bon Air, 2 instructors, 21 pupils; and South Side Acad., 5 instr., 110 pupils—tot. priv. sec. sch., 77; pupils, 4,400.

In 1901 the colleges for the higher education of women were Randolph-Macon Woman's College, Lynchburg (M. E. So.), with 22 professors and instructors, 276 students, 4,000 volumes in the library valued at \$5,000, \$148,000 in grounds and buildings, \$12,000 in scientific apparatus, and \$102,600 in productive funds; Martha Washington College, Abingdon (M. E. So.), 18 professors and instructors, 195 students, \$60,000 in grounds and buildings, and \$1,000 in scientific apparatus; Stonewall Jackson Institute, Abingdon (Presb.), 10 professors and instructors, 113 students, and \$30,000 in grounds and buildings; Southwest Virginia Institute, Bristol (Bapt.), 13 professors and instructors, 57 students, 1,200 vols. in the library valued at \$2,000, and \$125,000 in grounds and buildings; Albemarle College for Young Ladies, Charlottesville (non-sect.), 7 professors and instructors, 27 students and 100 vols. in the library valued at \$175; Roanoke Female College, Danville (Bapt.), 8 professors and instructors, 87 students, 1,000 vols. in the library, and \$25,000 in grounds and buildings; Hollins Institute, Hollins (non-sect.), 26 professors and instructors, 236 students, 2,000 vols. in the library valued at \$3,000, \$150,000 in grounds and buildings, and \$2,500 in scientific apparatus; Marion Female College, Marion (Luth.), 9 professors and instructors, 122 students, 200 vols. in the library and \$25,000 in grounds and buildings; Southern Female College, Petersburg (non-sect.), 12 professors and instructors, 140 students, 3,000 vols. in the library, \$1,000 in scientific apparatus, and \$25,000 in grounds and buildings; Valley Female College, Winchester (M. E. So.), 7 professors and instructors, 45 students, and \$20,000 in grounds and buildings; total institutions 10, instructors 132, pupils 1,298, value of grounds and buildings \$658,000; 11,650 volumes in the libraries, valued at \$14,123; value of scientific apparatus, \$17,300; income, \$130,000, and benefactions, \$10,000.

There were (1901-2) 11 colleges of liberal arts, with 140 professors and instructors, 2,388 students, 15 endowed professorships, 11 fellowships, 245 scholarships, 180,675 vols. in the libraries, \$156,300 in scientific apparatus, \$2,912,000 in grounds and buildings, \$1,911,203 in productive funds, \$343,717 in total income, and \$25,400 in benefactions. These colleges were: the University of Virginia (q.v.); Randolph-Macon College, Ashland (Methodist Episcopal, S.), chartered 1830, which

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had 10 instructors, 132 students, 9,000 vols. in library, \$95,000 in grounds and buildings, \$155,000 in productive funds, \$22,239 income, and \$1,600 benefactions; R. E. Blackwell, A.M., president; College of William and Mary (non-sect.), opened 1693; Emory and Henry College, Emory (Meth. Episc.), (1837), had 10 instructors 120 students, 10,000 vols. in library, \$100,000 in grounds and buildings, \$25,000 in productive funds, \$12,000 income, \$4,000 benefactions, R. G. Waterhouse, M.A., D.D., pres.; Hampden Sidney College, Hampden Sidney (non-sect.), opened 1776, chartered 1783, had 9 instructors 107 students, 15,000 vols. in library, \$150,000 in grounds and buildings, \$150 in productive funds, \$13,000 income, Richard McIlwaine, D.D., pres.; Washington and Lee University (q.v.); Richmond College, Richmond (Bapt.), opened 1832, 10 instructors, 230 students, 14,800 vols. in library, \$250,000 in grounds and buildings, \$250,000 in productive funds, F. A. Boatwright, M.A., pres.; Roanoke College, Salem (Luth.), opened 1853; Bridgewater College, Bridgewater (Ger. Bapt.), opened 1884; Fredericksburg College, Fredericksburg (Presb.), opened 1893; and Virginia Union University, Richmond (Bapt.), opened 1899.

Of schools of science endowed by the national land grant there were (1902) Virginia Agricultural and Mechanical College, Blacksburg, opened 1872, with 40 instructors, 482 students, 3,000 vols. in the library, \$117,000 in grounds and buildings, \$168,000 income, J. M. McBryde, pres.; and Hampton Normal and Agricultural Institute (q.v.), with 51 instructors, 1,037 students, 11,000 vols. in library, \$565,000 in grounds and buildings, \$180,000 in productive funds, \$184,000 income; Rev. H. B. Frissell, D.D., pres. There was also a school of science not so endowed, the Virginia Military Institute, Lexington, opened 1839. It had (1902) 19 instructors, 275 students, 12,283 vols. in the library, \$300,000 in grounds and buildings, \$20,000 in productive funds, \$83,000 income, Gen. Scott Shipp, LL.D., pres.

For professional instruction there were (1902) three schools of theology: Union Theological Seminary, Hampden Sidney (Presb.), opened 1824; Richmond Theological Seminary (Bapt.), 1867; and the Prot. Episc. Theological Seminary of Virginia, opened 1823, which together have 18 instructors, 164 students, 43,000 vols. in libraries, \$340,000 in grounds and buildings, \$639,000 in productive funds, \$18,000 income, and \$25,000 benefactions; three schools of law: the School of Law and Equity connected with Washington and Lee Univ., and the Law Schools connected with the Univ. of Virginia and Richmond College, which together had 12 instructors and 299 students; and three schools of medicine (reg.): the Med. Dept. of the Univ. of Va.; the Univ. Coll. of Med., Richmond, and the Med. Coll. of Va., Richmond, which together had 83 instructors and 597 students.

Excluding libraries connected with colleges, schools and school systems, and all others containing less than 1,000 vols., there were (1887-8) in V. 17 libraries, which

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had 112,768 vols., divided as follows: free public reference 4, vols. 57,429; free corporate lending 1, vols. 5,000; soc., assoc., and club 8, vols. 31,347; and corporate subscription 4, vols. 18,992. In 1902, Jan., there were reported 237 newspapers and periodicals, of which 31 were daily, 2 tri-weekly, 5 semi-weekly, 156 weekly, 2 semi-monthly, 37 monthly, 3 bi-monthly, and 1 quarterly.

Illiteracy.—Persons 10 years old and upward enumerated (1880) 1,059,034, unable to read 360,495, unable to write 430,352, whites unable to write 114,692; foreign-born whites enumerated 14,270, unable to write 777; whites 10–14 years old enumerated 103,948, unable to write 27,094; males 15,196, females 11,898; whites 15–20 years old enumerated 101,412, unable to write 16,594; males 8,944, females 7,650; whites 21 years old and upward enumerated 425,224, unable to write 71,004; males 31,474, females 39,530; colored persons 10 years old and upward enumerated 428,450, unable to write 315,660; colored 10–20 years old enumerated 160,838; unable to write 101,320; colored 21 years old and upward enumerated 267,612, unable to write 214,340. In 1900 the total population of voting age was 447,815, and of this number 112,073 were illiterate, of whom 35,327 were native whites.

Finances and Banking.—In 1880 V. had a net state debt of \$29,345,226; co. debt \$1,283,574; school district debt \$90,588; and city and town debt \$11,380,414—total \$42,099,802. The assessed real estate valuation was \$233,601,599; personal \$74,853,536—total \$308,455,135.—1890, July 1, the total of the outstanding unadjusted debt was \$20,413,832, on which there was a past-due interest charge of \$8,396,906, making total \$28,810,738. One year afterward the addition of interest made the total \$30,500,000, of which \$2,376,068 were held by V. schools and colleges, leaving \$28,123,932 in possession of public holders. This debt was assumed by the V. debt commission and the bondholders' committee, and Nov. 19 an agreement was made by the gov. and the debt commission on the one hand and representatives of the bondholders' committee on the other by which the latter promised to surrender to the state \$23,000,000 of the outstanding debt in exchange for \$19,000,000 in new bonds payable in 100 years at 2 per ct. interest the first 10 years and 3 per ct. thereafter, all bonds to bear date 1891, July 1. This agreement was ratified by the legislature 1892, Feb., and under it the bondholders' committee advertised 1893, Jan., for the transfer to it of all V. bonds held by the public. The gross debt, therefore, 1893, Jan. 1, was: 'Century' bonds, \$19,000,000, and 'Riddlebergers' \$6,033,628—total \$25,033,628. On 1903, Jan. 1, the total debt was \$24,371,017, and the assessed valuation was: real estate \$327,514,991; personal \$112,959,468; total \$440,474,459; tax rate \$4 per \$1,000. There were (1902, June 30) 57 national banks, with \$5,610,000 capital and \$1,896,889 surplus; 119 state banks, \$5,806,619 capital, \$1,775,824 surplus; 30 private banks, \$491,000 capital and \$198,360 surplus; and 17 loan and trust cos., \$2,204,354 cap. and \$149,877 surp.

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History.—The first permanent settlement by the English in America was made 1607, May 13, when a party of 105 colonists sent out by the Virginia Co. of London, to whom King James I. had granted the terr. 34° — 38° n. lat. and from the sea 100 m. inland, landed at the present Jamestown, on the James river. The expedition was commanded by Christopher Newport (q.v.), and was accompanied by Bartholomew Gosnold (q.v.), John Smith (q.v.), Edward M. Wingfield, and the Rev. Robert Hunt. This attempt to colonize the new world was saved from absolute failure by the exertions of John Smith, who assumed the direction of affairs and managed the colony till within a short time of the arrival of officers from England, appointed in accordance with a new charter granted to the reorganized London Company. In 1609 the new officers, Lord de la Warr, gov., Sir Thomas Gates, lieut.gov., Sir George Somers, admiral, Christopher Newport, vice-admiral, and Sir Thomas Dale, marshal, organized a new expedition of 9 vessels and 500 people. The lieut.gov., admiral, vice-admiral, and marshal accompanied the expedition, which lost two vessels on the voyage. Just as John Smith was obliged by a wound to return to England, the lieut.gov., admiral, and vice-admiral arrived at Jamestown, with 150 men and provisions from the vessel wrecked at the Bermudas. They found the colony much reduced in numbers, and were about abandoning the settlement, in 1610, June, when Lord de la Warr appeared with 3 vessels, supplies, and more colonists. Uniting the two parties, the gov. undertook to establish a permanent form of govt. at Jamestown, and built a trading-post at Hampton; but was compelled by impaired health to return to England 1611. Sir Thomas Dale, who had arrived with 300 more colonists, succeeded him, and was soon superseded by Sir Thomas Gates, who had brought over 350 additional colonists. Settlements were made at the present Dutch Gap and City Point. Gates soon returned to London; Dale resumed the executive office for a brief period, and, returning home, left the direction of affairs in the hands of Capt. Samuel Argall; and 1618 Lord de la Warr, prompted by the protests of the colonists against Argall's tyranny, determined to resume his duties as gov., but died while entering Delaware Bay. Sir George Yeardley, who was lieut.gov. 1616-7, was appointed gov. 1619, and gave the colonists a profitable and popular administration. Immediately after assuming the office, he convened at Jamestown an assembly of popularly elected delegates from the different plantations, the first elective body in America, and began promoting immigration, agriculture, and the cultivation of tobacco. In 1619 slavery was first established in the new world, the first slaves being 100 white convicts from British prisons, who were sent over by the king's order to be sold for servants for a term of years, and 20 negroes from Africa, taken to Jamestown on a Dutch man-of-war and sold for slaves for life. In 1621 a written constitution for the colony was granted, which provided for a representative govt. and trial by jury; 1622 the James river settlements were

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attacked by the Indians, who massacred nearly 350 people; and 1624 the V. Company was dissolved, and the colony became a crown possession. The people reluctantly submitted to the Commonwealth 1651, but promptly reaffirmed their loyalty to the Stuart dynasty 1660. The laws of the colony, which were revised 1632, were again revised 1661-2; the Church of England was re-established; and stringent laws were passed against all religious opponents. In 1676 the oppressive administration of Sir William Berkeley, added to a levy of additional taxes, culminated in an uprising known as 'Bacon's rebellion,' from Nathaniel Bacon, a popular leader, which was followed by the removal of Berkeley and the appointment of Lord Culpeper as gov. Williamsburg was founded 1699, and the seat of govt. was transferred thither 1700. The code was revised a fifth time 1705, and in it was inserted a declaration that slaves were real estate. V. suffered severely in the French war 1754, in which George Washington first became conspicuous as commander of the colonial troops. In 1764 the British parliament asserted the right to impose taxes on the colonies without permitting representation and without the consent of the people. This led to a strong protest by the V. house of burgesses; and in the following year, when the parliament passed the stamp, mutiny, and quartering acts, the assembly adopted the resolution offered by Patrick Henry (q.v.) denying the right of any foreign body to impose taxes on the colony. The colony was not represented in the first colonial congress (1765, Oct.), but the action and purpose of that body were heartily approved. A battle between the colonists and Indians occurred at Point Pleasant, on the Ohio river, 1774; the opposition of the people to the acts of congress led Lord Dunmore, the gov., to dissolve the assembly 1773 and 4; the gov. was forced to take refuge on a British man-of-war, and was declared by the assembly to have abdicated his office 1775, June; and a convention of delegates at Williamsburg issued a declaration of rights 1776, May, and adopted a state constitution June 12.

During the revolutionary war, naval attacks were made by the British on Norfolk, Portsmouth, and Gosport (1779); Richmond was captured and burned by Benedict Arnold (1781, Jan.); Jamestown was the scene of a battle (1781, July 9); and Lord Cornwallis surrendered his army to Washington at Yorktown (1781, Oct. 19). V. was ably represented in the federal constitutional convention, and ratified the constitution 1788, June 25.

For details of the part borne by V. in the civil war, see UNITED STATES OF AMERICA—*History*. After the close of the war, the Pierpont, or loyal, state govt. was recognized by Pres. Johnson, and Gov. Pierpont was appointed provisional gov. In 1869, July, the people adopted a new constitution, based on the reconstruction acts of congress; and 1879, Jan. 26, the state was restored to the Union. In 1902 another constitution was adopted.

Governor.—The executive authority is vested by the constitution in a governor elected for 4 years and incli-

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gible for a second successive term, salary \$5,000 per annum; a lieut.gov., elected at the same time and for the same term, salary as pres. of the senate \$10 per day while the legislature is in session; sec. of state (\$2,500), treas. (\$2,000), and auditor (\$3,000), elected for 2 years by the legislature; and second auditor (\$2,000), atty.gen. (\$2,500), supt. of education (\$2,500), supt. of land office (\$1,300), commissioner of agriculture (\$1,500), and adjt.gen. (\$600).

—The legislative authority is vested in a general assembly, comprising (1903) a senate of 40 mem., elected for 4 years, and a house of representatives of 100 members, elected for 2 years, salary of senators and representatives \$6 per day during the session. The legislature meets biennially on the second Wednesday in Jan., in odd-numbered years, and sessions are limited to 90 days each. Lunatics, idiots, convicts, duellists, U. S. soldiers, and non-payers of capitation tax are excluded from voting; and only such persons who are entitled to vote and hold office are competent for jury duty.—The judicial authority is vested in a supreme court, comprising a presiding judge and 4 judges, all elected by the legislature in joint session for 12 years, salary of presiding judge \$3,250, of each assoc. judge \$3,000; in a circuit court in each of the 16 judicial circuits into which the state is divided, each with a judge elected by the legislature for 8 years; and in a co. court in each co., with a judge similarly chosen for 6 years. Each city and town with 5,000 pop. is entitled to a corporation or hustings court, with a judge elected by the legislature for 6 years. The atty.gen. is elected for 4 years by the people. There are also 2 U. S. district courts, whose judges receive \$3,500 each per annum. 1900, June 30, there were in V. 3,575 post-offices, of which 3 were first-class, 14 second, 48 third, 65 presidential, 3,547 fourth, 1,785 money-order offices, and 21 money order stations.

The successive govts., with their terms of service, are as follows: *Under the Virginia Co.:* Edward M. Wingfield 1607; John Ratcliffe 1607–8; Capt. John Smith 1608–9; Sir George Percy 1609; Thomas West, Lord de la Warr, 1609–11; Thomas Dale 1611–16; George Yeardley 1616–7; Samuel Argall 1617–19; Sir George Yeardley 1619–21; Francis Wyatt 1621–25; *Under the Crown:* Sir George Yeardley 1626–7; Francis West 1627–8; John Potts 1628–9; John Hervey 1629–35; John West 1635; John Hervey 1635–39; Francis Wyatt 1639–41; Sir William Berkeley 1641–45; Richard Kemp 1645; Sir William Berkeley 1645–52; *Under the Commonwealth:* Richard Bennett 1652–56; Edward Digges 1656–58; Samuel Matthews 1658–60; *Under the Crown:* Sir William Berkeley 1660–77; Herbert Jeffries 1677–8; Henry Chicheley 1678–9; Thomas, Lord Culpeper, 1679–80; Henry Chicheley 1680–84; Lord Howard. Effingham, 1684–89; Nathaniel Bacon 1689–90; Francis Nicholson 1690–92; Sir Edmund Andros 1692–98; Francis Nicholson 1698–1704; Earl of Orkney 1704–5; Edward Nott 1705–6; Edmund Jennings 1706–10; Robert Hunter 1710; Alexander Spotswood 1710–22; Hugh Drysdale 1722–26; Robert Carter 1726–7; William Gooch 1727–49; John Robinson, Sr..

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1749; Lord Albemarle 1749-50; Louis Burwell 1750-52; Robert Dinwiddie 1752-58; John Blair 1758; Francis Fauquier 1758-68; John Blair 1768; Norborne Berkeley, Lord de Botetourt, 1768-70; William Nelson 1770-72; John, Lord Dunmore, 1772-76; *Under State Constitution*: Patrick Henry 1776-79; Thomas Jefferson 1779-81; Thomas Nelson 1781; Benjamin Harrison 1781-84; Patrick Henry 1784-86; Edmund Randolph 1786-88; Beverly Randolph 1788-91; Henry Lee 1791-94; Robert Brooke 1794-96; James Wood 1796-99; James Monroe 1799-1802; James Page 1802-05; William H. Cabell 1805-08; John Tyler 1808-11; James Monroe 1811; George W. Smith 1811-12; James Barbour 1812-14; Wilson C. Nicholas 1814-16; James P. Preston 1816-19; Thomas M. Randolph 1819-22; James Pleasant 1822-25; John Tyler 1825-27; William B. Giles 1827-30; John Floyd 1830-34; Littleton W. Tazewell 1834-36; Windham Robertson 1836-7; David Campbell 1837-40; Thomas W. Gilmer 1840-1; John Rutherford 1841-2; John M. Gregory 1842-3; James McDowell 1843-46; William Smith 1846-49; John B. Floyd 1849-52; Joseph Johnson 1852-56; Henry A. Wise 1856-60; John Letcher 1860-64; Francis H. Pierpont 1864-68; Henry H. Wells 1868-70; Gilbert C. Walker 1870-74; James L. Kemper 1874-78; Frederick W. W. Holliday 1878-82; William E. Cameron 1882-86; Fitzhugh Lee 1886-90; Philip W. McKinney, 1890-94; Charles T. O'Ferrall 1894-98; J. Hoge Tyler, 1898-1902; A. J. Montague, 1902-06.

Counties, Cities and Towns.—V. had (1900) 100 counties. In 1880 the most populous counties were: Henrico 82,703; Norfolk 58,657; Pittsylvania 52,589; Campbell 36,250; Augusta 35,710; Halifax 33,588; Albemarle 32,618; Bedford 31,205; Buckingham 29,567; Washington 25,203; and Franklin 25,084. The most populous *cities and towns* were: Richmond 63,600; Norfolk 21,966; Petersburg 21,656; Lynchburg 15,959; Alexandria 13,639; Portsmouth 11,390; Danville, 7,526; Staunton 6,664; Manchester 5,729; Fredericksburg 5,010; and Winchester 4,958. In 1900 the *counties* ranked: Norfolk 50,780; Pittsylvania 46,894; Halifax 37,197; Rockingham 33,527; Accomac 32,570; Augusta 32,370; Bedford 30,356; Henrico 30,062; Washington 28,995; Albemarle 28,473; Mecklenburg 26,551; Franklin 25,953; Tazewell 23,384; and Fauquier 23,374. The leading *cities and towns* were: Richmond 86,050; Norfolk 46,624; Petersburg 21,810; Lynchburg 18,891; Roanoke 21,495; Alexandria 14,528; Danville 16,520; Manchester, 9,715; Staunton 7,289; Charlottesville 6,449; Winchester 5,161; Fredericksburg 5,068; and Newport News 19,635.

Politics.—State, congressional and presidential elections are held on Tuesday after the first Monday in Nov. The state govt. (1903) was democratic in executive officers and legislature, with a party majority in the latter of 36 in the senate, 86 in the house, and 122 on joint ballot. V. had 12 electoral votes under the apportionment on the 1880 census, and no change was made in the 1890 or 1900 apportionment. For the presidential vote, see PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF,

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Population.—(1790) white 442,117, free colored 12,866, slaves 292,627, total 747,610; (1800) white 514,280, free colored 20,124, slaves 345,796, total 880,200; (1810) white 551,514, free colored 30,570, slaves 392,516, total 974,600; (1820) white 603,085, free colored 36,883, slaves 425,148, total 1,065,116; (1830) white 694,300, free colored 47,348, slaves 469,757, total 1,211,405; (1840) white 740,968, free colored 49,842, slaves 448,987, total 1,239,797; (1850) white 894,800, free colored 54,233, slaves 472,528, total 1,421,661; (1860) white 1,047,299, free colored 58,642, slaves 490,865, total 1,596,318; (1870) white 712,089, colored 512,841, total 1,224,930; (1880) white 880,858, colored 631,707, total 1,512,565; (1890) white 1,014,680, colored 540,867, total 1,655,980; (1900) white 1,192,855; colored 660,722; total 1,853,577.

VIRGINIA—VIRGINIA FENCE.

VIRGINIA, UNIVERSITY OF: institution of learning in Albemarle co., Va., near Charlottesville. It was chartered by the Va. legislature 1819, and an annual appropriation of \$15,000 (later increased to \$40,000) voted for its support. Thomas Jefferson drafted the scheme for its organization and system of instruction; and the inscription on his tomb, dictated by himself, declares that one of his titles to remembrance was that he was 'father of the University of Virginia.' The gov. of Va. appoints for a term of 4 years a board of 8 'visitors,' who from their own number elect one to be rector of the univ.; in this board is vested the govt. of the institution. Jefferson was the first rector; his immediate successor was James Madison. The visitors appoint the members of the faculty; and the chairman of the faculty, who holds office one year, is virtually pres. of the univ. The salaries of professors come in part (\$1,000) from the state and in part from tuition fees. The univ. consists of a number of mutually independent schools, each of which confers degrees on its own account; students are free to elect the schools that they will attend. The univ. is required to admit to the academic schools, free of charge, any youth, native of Va., who on examination proves his fitness. The institution has since 1885 shown a steady increase in the number of students, which was (1885-6) 303; (1886-7) 331; (1887-8) 391; (1888-9) 440; (1901-2) 600. Before the civil war the number was about 650. In 1902 there were 57 profs. and instructors, and in the collegiate dept. 291 students; in the dept. of professions 368; deducting names counted twice there were in all 600 students. The univ. had 4 scholarships and 3 fellowships. In the library there were 50,775 bound vols.; the value of the scientific apparatus was \$100,000; of the grounds and buildings \$1,250,000; the amount of the productive funds was \$377,000, yielding yearly income \$150,164. Tuition fees yielded \$76,570; state appropriation \$50,000. The institution suffered great loss from fire, 1896, Oct. 27, when the public hall and rotunda, as well as two-thirds of the library and several valuable paintings, were destroyed. The reconstruction brought an improvement.

VIRGINIA, WEST: state: see WEST VIRGINIA.

VIRGINIA CITY: city, cap. of Storey co., Nev.; on the Virginia and Truckee railroad, connecting at Reno with the Central Pacific; 15 m. n. e. of Carson City; 7,800 ft. above sea-level. It contains a court-house, 5 churches, 2 theatres, 2 banks, 2 hospitals, the largest hoisting-works over mines in the world, and 3 daily and 1 weekly newspapers. It is the metropolis of the state, has rich gold and silver mines, and is the site of the famous Comstock lode or Big Bonanza group of silver mines, that have yielded as much as \$30,000,000 in a single year. Business is confined to the mining industry. Pop. (1880) 10,917; (1890) 8,511; (1900) 2,695.

VIRGINIA CREEPER: see VITACEÆ.

VIRGINIA FENCE: a rail fence common in the United States and Canada, known also as *snake-fence*, *worm-fence*, and *stake-and-rider fence*. It consists of tiers of split rails

VIRGINIA QUAIL—VIRGIN ISLANDS.

laid horizontally in a zigzag manner, the ends resting on each other and generally braced or kept in place by a pair of posts driven slantingly into the ground at the angle formed by the intersection of two tiers.

VIRGINIA QUAIL, or **COLIN**: bird (*Ortyx Virginiana*) of family *Tetraonidæ*, abundant in N. America e. of the western plains; in some parts commonly known by the name of Quail, in others by that of Partridge. In size it is intermediate between the common quail and the common partridge of Britain. The prevalent color of the plumage is brownish red, underparts whitish; but all parts are more or less mottled with different colors. The feathers of the head are capable of being erected into a sort of crest. The call of the male is popularly regarded as resembling the words 'Bob White,' and this name is often given to it. The coveys of the V. Q. often approach houses in winter, and mingle with domestic poultry. Great numbers are killed by guns and taken in snares; and in the western and southern states many hundreds were often caught in a day by parties of men on horseback, driving the coveys into a great cylindrical net. It has been introduced into some parts of Europe, and may almost be regarded as naturalized, though rare in England.—There are several species of allied genera in Mexico, California, and n.w. America, of which one, the **CALIFORNIA QUAIL** (*Lophortyx Californicus*), is remarkable for its long and beautiful black crest. See **PARTRIDGE**.

VIRGINIA REEL: a country-dance which can be danced by an indefinite number of couples, and probably an adaptation from the dance known as Sir Roger de Coverley.

VIRGINIA SNAKE-ROOT: see **ARISTOLOCHIA**.

VIRGIN ISLANDS: group of more than 50 islands in the W. Indies, e. of Porto Rico; about 460 sq. m. Three of the islands, St. Thomas (q.v.), St. Croix (q.v.), and St. John, belong to Denmark; 240 sq. m.; pop. 30,527. The U. S. owns Vieque and Culebra (150 sq. m.), the former with pop. 6,000, the latter uninhabited. The others are British; about 70 sq. m.; pop. (1901) 4,908, of whom only about 150 are whites. The chief of the Brit. Islands are Tortola, Virgin-Gorda and Anegada. The Brit. possessions in the Virgin Islands form a dist. of the colony of the Leeward Islands, under a lieut.-gov., and are governed by an administrative council of 6 elective and 3 non-elective members. Revenue is about £700 per annum. The exports have average value nearly £3,300, imports about £3,200. The characteristic physical features are rugged heights and precipitous coast-lines, with numerous bays, havens, and creeks. Extensive tracts of land, possessed by the emancipated blacks, are covered with guinea-grass, good pasturage for cows, sheep, and goats. A valuable mine of copper has been worked at Virgin-Gorda; and other valuable minerals have been found. Cotton, sugar, ginger, and indigo are principal products.—The V. I. were discovered by Columbus on his second voyage, 1494. In the 17th c. they were the favorite resort of the **Buccaneers** (q.v.) Total pop. of group (1901) 28,894.

VIRGIN MARY—VIROSE.

VIR'GIN MARY: see MARY, THE BLESSED VIRGIN.

VIR'GIN'S BOWER: see CLEMATIS.

VIRGULATE, a. *vēr'gū-lāt* [L. *virgūla*, 'dim. of *virga*, a rod]: shaped like a rod or wand. **VIRGULTUM**, n. *vēr-gūl'tūm* [L.]: a long slender branch.

VIRIAL, n. *vīr'ī-al*: in *physics*, the aggregate of the attractions of each pair of particles of a system of particles when the attraction of each is multiplied by the distance between the pair.

VIRIATHUS, *vī-rī'a-thūs*: Lusitanian (i.e., Portuguese) robber and patriot: d. B.C. 140. V. was a shepherd who became a guerrilla chief, making predatory excursions into Spanish territory. This brought him into collision with Rome; and, B.C. 151, the propretor, Ser. Galba—who was sent to reduce the Lusitanians to subjection—treacherously destroyed a large body of the natives. V., inspired with implacable animosity toward the Romans, became the leader of his countrymen; and, B.C. 147, defeated Vetilius the Roman propretor, near Tribola. After two years, in which he won several victories, the consul, Q. Fabius Æmilianus, encountered him in Andalusia B.C. 144, with a large army of 15,000 foot and 2,000 horse; and V. was driven back into his native fastnesses. But the Spanish tribes then joined the Lusitanians in insurrection; and the Roman army was utterly crushed at the 'Hill of Venus,' B.C. 143. Next year a Roman consul brought a force which drove V. out of Spain; but, B.C. 141, the consul with his whole army was surrounded in a mountain pass, and forced to unconditional surrender. V., with remarkable magnanimity, released his captives unhurt on condition that Lusitanian independence should be recognized; but the next year another consul (brother of the first) suddenly resumed the war, and bribed some Lusitanian envoys (sent to him by V.) to murder their master, which they did while he lay sleeping in his tent. With him Lusitanian independence practically fell.

VIRIDITY, n. *vī-rīd'ī-tī* [L. *viriditas*, greenness—from *viridis*, green: It. *viridità*]: greenness; the color of fresh vegetables. **VIRIDNESS**, n. *vīr'īd-nēs*, greenness. **VIRIDES-CENCE**, n. *vīr-ī-dēs'ēns*, a being or becoming slightly green; greenish character, state, or appearance. **VIRIDES-CENT**, a. *-ēnt*, slightly green; shading into green.

VIRILE, a. *vīr'īl* or *-īl* [F. *viril*—from L. *virilis*, male—from *vir*, a man: It. *virile*]: pertaining to a man in his mature state; not puerile or feminine. **VIRILITY**, n. *vī-rīl'ī-tī* [L. *virilitas*]: manhood; power of procreation; state and characteristic of the adult male. **VIRILES-CENCE**, n. *-ēs'ēns*, the assumption by an aged female of male characteristics. **VIRILES-CENT**, a. *-ēs'ēnt*, assuming male characteristics, as a hen past laying when she tries to crow, or develops plumage like that of a cock.

VIROLE, n. *vīr ōl* [F. *virole*, a ring]: a Ferrule (q.v.); in *her.*, a hoop or ring; the mouthpiece of a bugle or hunting-horn.

VIROSE see under VIRUS.

VIRTU—VIRUS.

VIRTU, n. *ver'tô* [It. *virtù*, worth]: artistic excellence, as in the phrase **ARTICLES OF VIRTU**; spelled also **VERTU**. **VIRTUOSO**, n. *ver'tū-ō'sō* [It. , a person skilled in some art]: one skilled in a knowledge of the fine arts, in antiquities, curiosities, and the like; plu. **VIR'TUO SI**, -*sī*. **VIR'TUOS'ITY**, n. -*ōs'ī-tī*, the class of virtuosos; exceptional skill in a fine art.

VIR'TUAL VELOC'ITY: see **WORK**.

VIRTUE, n. *ver'tū* [L. *virtus* or *virtutem*, bravery, moral perfection—from *vir*, a man: It. *virtù*: F. *vertu*: comp. Gael. *fear*, a man]: moral goodness or some particular moral goodness; that quality possessed by bodies by which they produce effects; inherent power; efficacy; medicinal quality or efficacy; legal efficacy; secret agency; excellence, right conduct; female chastity; in *OE.*, bravery; valor; the chief or essential element; one of the orders of the celestial hierarchy. **VIR'TUELESS**, a. -*lēś*, having no virtue, efficacy, or value. **VIR'TUAL**, a. -*tū-āl*, in effect though not in fact; having power of invisible efficacy without the material part. **VIRTUALITY**, n. *ver-tū-āl'ī-tī*, the state or quality of being virtual. **VIR'TUALLY**, ad. -*lī*, in efficacy or effect only. **VIR'TUOUS**, a. -*ūs*, morally good; abstaining from vice; chaste, as a woman; in *OE.*, efficacious; powerful; courageous. **VIR'TUOUSLY**, ad. -*lī*. **VIR'TUOUSNESS**, n. -*nēs*, the quality of being virtuous.

VIRULENT, a. *vir'ū-lēnt* [F. *virulent*—from L. *virulentus*, full of poison—from *vīrus*, a slimy liquid, poison: It. *virulento*]: very poisonous or venomous; bitter in enmity; malignant, as language. **VIR'ULENTLY**, ad. -*lī*. **VIR'ULENCE**, n. -*lēns* [F.—L.], or, in *OE.*, **VIR'ULENCY**, n. -*lēn-sī*, that quality which renders a thing extremely active in doing injury; extreme bitterness or malignity.

VIRUS, n. *vir'ūs* [L. *vīrus*, poison]: contagious or poisonous matter of an ulcer or a pustule, etc.; any foul hurtful matter: bitterness; malignity. **VI'ROSE**, a. -*rōs* [L. *vīrōsus*]: poisonous; in *bot.*, offensive in smell.—*Vīrus* is used in medicine to signify any one of those poisonous agencies which produce Zymotic Diseases (q.v.) such as smallpox, measles, scarlatina, the various forms of continued fever, ague, hooping-cough, cholera, syphilis, glanders, hydrophobia, etc. While each of these morbid poisons (as they are frequently called) has a definite and specific action, they collectively obey certain laws—e.g., (1) Their actions are variously limited, some affecting only one organ or system of organs, others involving two or more organs or systems of organs—thus, in bronchocele or goitre the poison acts only on the thyroid gland; while in hooping-cough and hydrophobia all the organs supplied by the pneumogastric Nerves (q.v.) are affected, and most of the organs are affected by paludal or malarian poison. (2) Morbid poisons, like medicines and ordinary poisons, have their period of latency. A medicine is seldom longer than a few hours in exhibiting its effects; but the poisons of scarlatina, measles, and smallpox remain latent in the system for at least 7, 10, and 16 days respectively; while

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that of paludal fever and hydrophobia may be dormant for a year or more. (3) When several tissues or organs are acted on, the actions may be simultaneous, but are usually consecutive, a considerable interval often elapsing between the attacks. (4) Two morbid poisons may co-exist in the same person—e.g., smallpox and cow-pox have often been seen at the same time in the same person: in this case, each disease runs its course unaffected by the other; but usually, when two co-exist, one lies latent while the other runs its course—thus, a case of intermittent fever may suddenly subside, and smallpox make its appearance; on recovery from this disease, the intermittent fever may return.

Among peculiarities presented by morbid poisons, the following are noteworthy: (1) In experiments on the inoculation of the smallpox virus by Fordyce, it was found that extremely diluted poison, if it acted at all, produced the same effects as the concentrated virus: hence it may be inferred that the intensity of the disease is not proportional to the amount of virus received into the system. (2) Women in childbed may not only engender a special poison of this class—that of puerperal fever—but are highly susceptible of these poisons, and almost always succumb to their action. (3) A peculiarity of morbid poisons, wholly unknown in medicinal substances, is the faculty which the human body possesses of generating to an enormous extent a poison of the same nature as that by which the disease was originally produced. A quantity of smallpox matter not so big as a pin's head will produce many thousand pustules, each containing fifty times as much pestilent matter as was originally inserted; and the miasmata secreted by one child suffering from whooping-cough may infect a whole city: see SYPHILIS. (4) These morbid poisons generally possess the property of never (or in only very rare cases) occurring more than once in the life of the same individual: this is true with scarlatina, measles, smallpox, whooping-cough, and (to a less extent) typhoid and typhus fevers. (5) This class of poisons is powerfully influenced by climate, and probably by the nature of the soil: thus, the severe forms of typhus common in some temperate regions are hardly known in warmer climates; and the influence of cold weather or of a cool climate in checking the ravages of cholera and plague is well known.—See TYPHUS: ZYMOTIC DISEASES: GERM-THEORY.

VIS, *n. vis* [L. *vis*, strength, force]: in *mech.*, force; power. VIS ACCELERATRIX, accelerating force. VIS-A-FRONTÉ, *vis-ă-frŏn'tě* [L., force from the front]: an attraction from the front. VIS-A-TERGO, *-těr'gō* [L., force from the back]: a propulsion from behind. VIS IMPRESSA, impressed force—that is, the force exerted as in moving a body or in changing its direction. VIS INERTIÆ, *vis in-ěr'shĭ-ē* [L., strength of inactivity]: the power by which matter resists changes that are attempted to be made on its state; *fig.*, resistance offered by the innate inertness of persons, or their unwillingness to alter habits. VIS MEDICA-

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TRIX NATURÆ, in *therapeutics*, power which nature has (unaided by medicine) of effecting cures. **VIS MORTUA**, dead force; force doing no work, but merely producing pressure, as a body at rest. **VIS NERVOSA**, *nēr-vō'sà* [L. *nervōsus*, nervous—from *nervus*, a nerve]: the property of nerves by which they convey stimuli to muscles either directly or circuitously. **VIS VITÆ**, *vī tē* [L., force of life]: vital power or energy. **VIS VIVA**: see **WORK**.

VISA: see under **Visé**.

VISAGE, n. *vīz'āj* [F. *visage*; It. *visaggio*, face—from L. *visus*, look, sight—from *vidēre*, to see]: the look; the face; the appearance; the countenance. **VIS'AGED**, a. *-āj'd*, having a visage or countenance.

VISARD, n. *vīz'érd* [see **Visor**]: a mask: V. to mask.

VIS-À-VIS, n. *vīz'â-vē* [F., face to face, opposite]: one who or that which is face to face with another; a carriage in which two persons sit face to face; a sociable: **AD.** face to face.

VISCERA, n. plu. *vīs'sēr-ă* [L. *viscus*, plu. *viscēra*, the entrails]: the bowels; the contents of the four great cavities of the body—the abdomen, thorax, cranium, and pelvis. **VIS'CERAL**, a. *-ăl*, pertaining to the viscera. **VIS'CERATE**, v. *-ăt*, to eviscerate; to disembowel. **VISCERALGIA**, n. *vīs'ēr-ăl'jĭ-a* [from *viscera*, and Gr. *algos*, pain]: pain in the viscera; neuralgia of the abdominal viscera. **VISCERIMOTOR**, a. *vīs'ê-rĭ-mō'tōr*, conveying motor influence to one of the viscera—applied to a nerve. **VISCEROSKELETAL**, a. *vīs'ēr-ō-skēl'ē-tăl*, of or pertaining to the skeleton of the visceral cavities. **VIS'CUS**, n. *-kūs*, in *anat.*, one of the organs, as the brain, the heart, the liver, and the spleen, contained within the four great cavities of the body.

VISCID, a. *vīs'sīd* [mid. L. *viscidus*, clammy—from L. *viscum*, the mistletoe, bird-lime made from the mistletoe; It. *viscido*, glutinous]: glutinous; sticky; tenacious. **VISCIDITY**, n. *vīs-sīd'ĭ-tĭ*, tenacity; stickiness. **VISCOUS**, a. *vīs'kūs*, glutinous; sticky; adhesive. **VISCOSITY**, n. *vīs-kūs'ĭ-tĭ*, tenacity; stickiness; also **VIS'COUSNESS**, n. *-nēs*. **VIS'CIN**, n. *-sĭn*, the glutinous constituent of the mistletoe.

VISCONTI, *vīs-kon'tē*: Lombard family which rose to sovereign rank in n. Italy in the 13th c.; notable in political and ecclesiastical contests of the middle ages. The name, derived from the Latin official title *vicecomites*, had gradually become a family surname, though the date of its application to this family is unknown. The family descended, according to tradition, from Desiderius, last king of the Lombards, and belonged to the feudal nobility of n. Lombardy, having large estates near Lakes Como and Maggiore.—The first who appears prominently in history is **OTTONE V.**, who became, 1078, viscount (*vicecomites*) of the archbishopric of Milan.—The founder of the V. sovereignty was another **OTTONE V.**, appointed abp. of Milan 1262 by Pope Urban IV. This appointment being considered by the party of the Torriani (which had been in power in Milan) as an infringement of the rights of the chap-

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ter, was opposed by them; and their leader, Martino della Torre, and his successors, forced the abp. to exile himself for 15 years. At last the exiled Ottone advanced on Milan at the head of a body of exiles and emigrants, defeated and captured his rival in a bloody and desperate conflict near Desio (1277, Jan. 21), and entered the city—hailed by the people as abp. and perpetual lord of Milan. But during the 11 years of his temporal sovereignty he was in almost constant warfare with the Torriani: he died 1295.—The contest was continued by his grand-nephew, MATTEO V., a prudent ruler, whom Emperor Adolf made imperial vicar in Lombardy. Expelled by the Torriani and their allies 1302, he was restored 1311 by the aid of Emperor Henry VII., and reappointed imperial vicar in consideration of the payment of 40,000 florins; and Pavia, Alessandria, Tortona, Cremona, Bergamo, Lodi, etc., were forced to acknowledge his authority. For his refusal to yield to the papal claims regarding the appointment to the Milan archiepiscopate, Pope John XXII. condemned him as a confirmed heretic, and stigmatized him and his descendants as perpetually infamous (1322). Matteo died three months afterward.—His son GALEAZZO I. was chosen his successor. (ruled 1322–28), and immediately the pope proclaimed a religious crusade against the heretical V., and the ‘holy army’ advanced on Milan 1323, committing horrible ravages during its march. But Emperor Ludwig (of Bavaria) sent troops to aid the V., and the invaders were totally defeated at Vavrio, on the Adda (1324), and their leader, Cardona, captured.—Soon afterward Galeazzo, by the intrigues of his ambitious brother Marco, was perpetually exiled; yet his eldest son, Azzo V., succeeded him (ruled 1328–39), while the anti-pope Nicholas confirmed the third son Giovanni in the archiepiscopate—events which led Pope John XXII. to recall his excommunication of the Visconti. Azzo was the greatest prince of the V.; he improved and embellished Milan, calling to his aid the painter Giotto (q.v.) from Florence, and the sculptor Balducci from Pisa. By war he extended his sway over almost the whole of Lombardy. His two uncles, the abp. GIOVANNI (ruled 1349–54) and LUCCHINO (ruled 1339–49), were chosen joint rulers in his stead; the latter, an able, resolute, and unscrupulous prince, assuming the temporal sovereignty. Under his sway, Montferrat was added to the dominions of the V.; Pisa became tributary; a regular police was established; and all offenders were punished with impartial severity. But the vices of suspicion, lust, and revenge led Lucchino into cruel tyranny, and he died by poison 1349. From this time the peaceful abp. reigned alone, availing himself of the assistance of his nephews in the more arduous tasks of government. He purchased Bologna for 200,000 florins 1350; in 1353 accepted the lordship of Genoa, which had been almost crushed by its rival, Venice; and, taking up the quarrel of his new subjects, equipped a fleet which, under Paganino Doria, gained a complete victory over the Venetians. He was the generous patron and friend of Petrarch, and the last good

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prince of the V. family.—His three nephews conjointly succeeded him 1354; but 1355 the eldest had died of poison, and his dominions were shared between the other two, GALEAZZO (ruled in Pavia 1354–78) and BARNABO (ruled in Milan 1354–85). Both princes were men of ability, but irreclaimably vicious, the latter a monster of cruelty. Bologna fell into the hands of the pope, who excommunicated Barnabo for attempting to recover it; but the V. prince laughed at the holy father's curse, and swore that he would be both pope and emperor in his own dominions. Innocent VI. then sent legates to propose terms; but the young savage compelled the unfortunate messengers to tear their master's bulls to fragments, and swallow them piece by piece. One of his acts was commendable: he ended a long and mischievous controversy by an edict forbidding even the mention of the names 'Guelf' and 'Ghibelline,' under pain of having the tongue cut out. His brother Galeazzo was the 'Mæcenæ' of his time: he befriended Petrarch, and founded under his direction the Univ. of Pavia; the invention known as 'Galeazzo's Lent,' a system of torture calculated to prolong the victim's life for 40 days, stamps him with the family character of cruelty.—His son GIAN-GALEAZZO succeeded him in Pavia and its dependencies (ruled 1378–1402); and by treacherously seizing and imprisoning his uncle Barnabo, of Milan, became sole ruler of Lombardy. He had all the great qualities and most of the vices of the V., and openly aspired to the sovereignty of Italy; conquering Padua, Verona, Vicenza; extending his dominions to the gates of Florence, which he also attacked; and purchasing from Emperor Wenceslas the absolute sovereignty of his dominions, with the title *Duke of Milan*, for 100,000 gold florins. This curtailment of the empire displeased Germany; but an invasion of Lombardy was met at Brescia, and swiftly driven back beyond the Alps. Florence was at the point of surrender, when Gian died of the plague 1402. He was a great patron of letters and science, gathered eminent men around him, reorganized the Univ. of Piacenza, established a magnificent library, constructed the famous bridge over the Ticino at Pavia, and began the erection of the famous cathedral of Milan. His daughter Valentina married Louis, younger brother of Charles VI. of France, and became grandmother of Louis XII., who founded on this relationship his claims to the Milanese.—His sons GIAMMARIA V. (Giovanni-Maria) (ruled at Milan 1402–12) and FILIPPO-MARIA V. (ruled at Pavia 1402–47) succeeded him; but the former, who was cowardly, suspicious, and insanely cruel, was, in the interests of his subjects, stabbed to death, 1412; and the younger brother, equally timorous and suspicious and of only average cruelty, became sole ruler—last male ruler of the V. house. The Venetians on the e., the Marquis of Montferrat on the w., and the pope on the s., were rapidly curtailing his dominions, when, by a politic marriage, he procured the services of a band of veteran soldiers, chose Carmagnola (q.v.) as his general, and regained his domin-

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ions. In 1441, he engaged the services of Francesco Sforza, to whom he gave his natural daughter Bianca in marriage; and on his death, 1447, the V. family was succeeded by that of Sforza (q.v.) in the lordship of the Milanese.—Collateral branches of the V. still exist in Lombardy.—See, Lilla's *Famiglie Celebri Italiane*; Verri's *Storia di Milano*; and Muratori's *Annali d'Italia*.

VISCON'TI, ENNIO-QUIRINO : one of a distinguished family of archæologists and architects: 1751, Nov. 1—1818, Feb.; b. Rome; eldest son of GIOVANNI BATTISTA V., a native of Sarzana, who settled at Rome, succeeded Winckelmann as prefect of the antiquities of Rome, and d. 1784. The young V. was educated by his father for the priesthood, but this profession he afterward refused. He was appointed conservator of the Capitoline Museum at Rome; and had gained a European reputation as archæologist, when the arrival of the Neapolitan army caused him to emigrate to Paris, where he was made an administrator of the Louvre, and prof. of archæology. In 1804 he prepared, at Napoleon's request, a series of portraits of the distinguished men of ancient Greece and Rome (perhaps the greatest of his works), *Iconographie Grecque* (3 vols. 4to, 1808) and *Iconographie Romaine* (1 vol. 4to, 1817). He issued also many dissertations (with illustrations) on ancient art. Besides his immense antiquarian knowledge, V. had extensive acquaintance with the history, languages, mythology, and manners of the classic age.—His younger brother, **FILIPPO AURELIO V.** (died at Rome 1830), also was an eminent archæologist, pres. of the commission of antiquities and fine arts at Rome 1809–14.—**LOUIS-JOACHIM V.**, son of Ennio-Quirino V. (1797–1853, b. Rome, d. Paris), was one of the official architects and surveyors of Paris, and architect of the Bibliothèque Royale 1825. His designs include some of the first fountains of Paris, the tomb of Napoleon I., and many public and private buildings—the chief being the plans for the completion of the Louvre on a magnificent scale.—Louis-Joachim's nephew **PIERRE-HERCULES V.**, celebrated archæologist, became prof. of archæology in the National Acad. of France, at Rome.

VISCOUNT, n. *vī'kownt* [OF. *visconte*; F. *vicomte*, a viscount—from L. *vicē*, instead of, and *comes*, earl (see COUNT 2)]: title of nobility immediately below an earl and above a baron; formerly, one who acted as sheriff of a county in place of the count or earl. **VIS'COUNTRESS**, n. *-ēs*, wife of a viscount.—*Viscount* was originally the title of the officer who acted as deputy to the earl, the earl being the king's immediate officer within his county. When the title Earl (q.v.) became hereditary (under William the Conqueror), a deputy had necessarily to be appointed in all cases where the earl was a minor, or otherwise incapacitated for his office. This deputy gradually became a permanent officer, otherwise known as the Sheriff, whose Latin designation continued to be *vicecomes*. The hereditary title of V. is a de



Viscount's Coronet.

VISCOUS—VISHNI-VOLOTCHOK.

gree of nobility unconnected with office. It was granted first 1440, Feb. 12, to John, Baron Beaumont, who was created a peer by the title Viscount Beaumont. A V. is now the fourth degree of nobility in the United Kingdom. A viscount is styled 'Right Honorable;' his wife is a viscountess; his eldest son has no courtesy-title of peerage; but all his sons and daughters are styled 'Honorable.'

VISCOUS: see under VISCID.

VIS'CUM: genus of parasitic plants which includes the *Mistletoe* (q. v.).

VISCUS: see under VISCERA.

WISE, n. *vīs* [OF. *vis*, a screw, a winding stair; from L. *vitis*, a vine]: a spiral or corkscrew staircase, the form most generally used in mediæval buildings in which the steps wind round, and rest at one end on a perpendicular pillar called the Newel (q. v.), and at the other end rest in the wall; the newel itself: in *mechanics*, a gripping appliance of wood or iron, consisting essentially of two movable jaws moved by a screw, and used to hold an object in place while work is being performed on it: it may be either portable, or fixed to a work-bench.

VISÉ, n. *vě'zā*, or VISA, n. *vě'sā* [F. *visé*, pp. of *viser*, to put one's visa to—from L. *visus*, pp. of *vidēre*, to see]: indorsement made on a passport or the like, denoting that it has been examined by the proper authorities to show that it is in order; official indorsement: V. to examine and indorse, as a passport. VI'SÉING, imp. -*ing*. VI'SÉED, pp. -*zād*. Also spelled VI'SA, VI SAING, VI'SAED.

WISEU, *vě'sā-ô*: city of Portugal, prov. of Beira; in a wide, fruit producing plain, 1,300 ft. above sea-level; 50 m. n.e. of Coimbra. Its cathedral is a striking flamboyant edifice, and contains excellent pictures by Gran Vasco, the Portuguese Fra Angelico. In the vicinity is the old Roman camp, Cava de Viriato. The town, one of the oldest in the country, contains other Roman as well as Gothic and Moorish remains. A large fair is held here.—Pop. (1878) 7,242.

VISHNI-VOLOTCHOK. *vĭsh'nĕ-vō-lō-chōk'*: town of Russia, govt. of Tver; on the river Tzna; about 230 m. s.e. of St. Petersburg by railway. It is on the Vishni-Volotchok water-route constructed by Peter the Great, connecting the navigation of the Baltic and Caspian seas by means of the Volga, etc. There is a very extensive transit-trade.—Pop. (1885) 15,838.

VISHN'U, n. *viṣh'nô* [Skr. *Vishnu*—from *viṣh*, to pervade, to extend through nature]: a Hindu divinity regarded as the 'preserver,' the second of the Hindu Trimûrti: (q.v.), but considered by his worshippers to be the supreme deity of the Hindu Pantheon (see VAISHN'AVAS: also INDIA—*Religion*). In the R'igveda, V. represents the sun, who 'strides through the seven regions of the earth,' and 'in three ways plants his step' (or, as Yâska explains, plants his steps so as to become threefold). And, according to one predecessor of Yâska, these three steps mean the manifestation of the sun at its place of rising, on the meridian, and at its place of setting; or, according to another, its manifestation on earth, in the intermediate space, and in heaven; when—as a later commentator observes—in the first of these manifestations, V. represents fire; in the second, lightning; and in the third, the solar light. From this position which V. holds in the R'igveda (see VEDA), it results that he was not regarded there as supreme, or even as equal to other deities who at the Vedic period occupied a foremost rank. He is extolled in several hymns as having 'established the heavens and the earth,' as 'being beyond mortal comprehension,' etc.; but he is there described also as having derived his power of striding over the world from *Indra* (q.v.), and as celebrating the praises of this god. He is frequently invoked together with the latter, but apparently always as inferior to him; and often, too, he occurs in company with a number of other gods, such as Varun'a, the Maruts, Rudra, Vâyu, the luminous deities called *Adityas*, and others, with no distinction in their respective rank. Fewer hymns, moreover, are separately devoted to his praise than to that of Agni, Indra, or other prominent gods of the Vedic period; and it deserves notice, too, that at that period he was not yet included among the *Adityas*, for only at the epic period—when the number of these deities, originally varying from six to eight, was raised to twelve—V. was included in it—he then being named as the foremost of these luminous offsprings of Aditi, or space.

Although some of the Brâhman'as of the Vedas (q.v.) already show the progress which the solar V. had made in the imagination of the people, and though they contain the germ of several legends which at a later time became fully developed, the really mythological character of this god, as the basis of the divine worship now paid him by a large class of the Hindu population, belongs to the epic poems—the *Râmâyan'a* and *Mahâbhârata* (q.v.)—and to the *Purân'as* (q.v.). In the *Mahâbhârata*, V. is often identified with the supreme spirit; but while in some portions of this poem—the different parts of which belong to different epochs of Hindu antiquity—he is thus regarded as the most exalted deity, he is in others represented as paying homage to S'iva (q.v.), the third of the Trimûrti. Taking, therefore, the *Mahâbhârata* as a whole, he does not occupy, in this epos, the exclusive supremacy which is assigned to him in the *Râmâyan'a*, and still more in those *Purân'as* especially devoted to his praise.

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The large circle of myths relating to V., in the epic poems and Purân'as, is distinguished by a feature which, though not quite absent from the mythological history of S'iva, especially characterizes that of Vishn'u. It arose from the idea that whenever a great disorder, physical or moral, disturbed the world, V. descended 'in a small portion of his essence' to set it right, to restore the law, and thus to preserve creation. Such descents of the god are called his *Avatâras* [from *ava* and *tr'î*, descend]; and they consist in V.'s being supposed to have either assumed the form of some wonderful animal or superhuman being, or to have been born of human parents, in a human form, always, of course, possessed of miraculous properties. Some of these *Avatâras* are of entirely cosmical character; others are probably based on historical events, the leading personage of which was gradually endowed with divine attributes, until he was regarded as the incarnation of the deity itself. Except the last, all these *Avatâras* belong to the past; the last is yet to come. Their number as usually received is 10, and their names in the following order: 1, the fish-; 2, the tortoise-; 3, the boar-; 4, the man-lion-; 5, the dwarf-; 6, the Paras'u-Râma-; 7, the Râmachandra, or, briefly, Râma-; 8, the Kr'ishn'a- and Balarâma-; 9, the Buddha-; 10, the Kalki- or Kalkin-*Avatâra*. This number and enumeration of *Avatâras*, however, has not been at all times the same. The *Mahâbhârata*, though also mentioning 10, gives a somewhat different succession. The *Bhâgavata-Purân'a* speaks of 22; and other works have 24 *Avatâras*, or even call them numberless.

1. The *Matsya-* or *fish-Avatâra*.—When, at the end of the last mundane age (the *Bhâgavata-Purân'a* relates), Brahman, the first god of the Trimûrti, had fallen asleep, a powerful demon, *Hayagrîva*, stole the Vedas (see VEDA) which had issued from the mouth of Brahman and lay by his side. About that time, a royal saint, *Satyavrata*, had by his penance attained the rank of a Manu; and V., who had witnessed the theft by *Hayagrîva*, and intended to slay him, assumed for this purpose the form of a very small fish, and glided into the hands of the saint when the latter made his daily ablutions in the river. Manu (the saint), about to release the little fish, was asked by it not to expose it to destruction by the larger fish in the river, but to place it in his water-jar. The saint complied; but in one night the fish grew so large that, at its request, he had to transfer it to a pond. Soon the pond also becoming insufficient, Manu had to choose a larger pond for it; and, after other changes, he took it to the ocean. *Satyavrata* (the saint) now understood that the fish was no other than *Nârâyan'a* or V.; and, after he had paid his adoration to the god, the latter revealed to him the imminence of a deluge which would destroy the world, and told him that a large vessel would appear to him, in which he was to embark with the seven Rishis, taking with him all the plants and all the seeds of created things. Manu obeyed the behest of the god; and when the water covered the surface of the earth, V. again appeared to him in the

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shape of a golden fish with a single horn—the fish being 10,000 miles long; and to this horn Manu attached the vessel, by means of V.'s serpent, which served as a cord. While floating in the vessel, Manu was instructed by the fish-god in the philosophical doctrines and in the science of the supreme spirit; and after the deluge had subsided, the fish-god killed Hayagrîva, restored the Vedas to Brahman, and taught them to the Manu Satyavrata, who in the present mundane age was born under the name of *S'râd-dhadeva*, as the son of Vivasvat.—A fuller account of this Avatâra and of the gods is in the *Matsya-Purân'a*—the fish-god's instructions including all the detail usual in a *Purân'a* (q.v.), relative to creation, the patriarchs, progenitors, regal dynasties, the duties of the different orders, etc. In the *Mahâbhârata* the same legend occurs with many variations, of which an important one is that the fish is a personification not of V., but of Brahman; and that the deluge occurs in the present mundane age.

2. The *Kûrma-* or *tortoise-Avatâra*.—When, of old, the gods felt their powers impaired, and were desirous of obtaining *Amr'ita*, the beverage of immortality, V. directed them, together with the demons, to churn the milk-sea, by taking the mountain *Mandara* for their staff; while he himself consented to support the mountain on his back, after having assumed the shape of a gigantic tortoise. One result of this churning of the sea of milk was a violent contest between the gods and demons, in which the demons were defeated: see RÂHU.—The legend on which the tortoise Avatâra of V. is based seems to belong entirely to the post-Vedic period of Hinduism.

3. The *Varâha-* or *boar-Avatâra*.—This is supposed to have taken place when, at the period of creation, the earth was immersed in water, and V., in order to raise it up, assumed the form of a gigantic boar. In the earlier recension of the *Râmâyan'a* and the *Linga-Purân'a*, it was Brahman, creator of the universe, who transformed himself into a boar to rescue the earth from its imperilled position: at a later period, this Avatâra is generally attributed to Vishn'u. Between both conceptions there is this great difference, that in the former the transformation of the deity into a boar has apparently a purely cosmical character; whereas in the latter 'it allegorically represents the extrication of the world from a deluge of iniquity, by the rites of religion.' (Wilson's translation of the *Vishn'u-Purân'a*, 2d ed., I. 59, note.) From other forms of this legend in the *Bhâgavata-Purân'a*, and in one of the later portions of the *Mahâbhârata*, it is evident that the boar-Avatâra had gradually lost its original character, and assumed that common to the remaining Avatâras, of representing the deity as become incarnate to remedy moral or religious wrong, or to destroy influences hostile to the pretensions of the Brâhmanic caste.

4. The *Nr'isinha-* or *man-lion-Avatâra*.—The demon *Hiran'yakas'ipu* had resolved to become a sovereign of the three worlds, and exempt from death and decay. To attain this end, he practiced severe austerities, and ulti-

mately received from Brahman, as the reward, a promise that he should become a supreme ruler, and death should not accrue to him from any created being, neither within his abode nor without, neither by day nor by night, neither in heaven nor on earth, nor by any kind of weapon. Possessed of this boon, he oppressed all the gods, robbed them of their shares in the sacrifices, and threatened their destruction. But he had a son, *Prahrâda* or *Prahlâda*, who had become a devout worshipper of Vishn'u: wherefore he resolved to kill this son, and was about to cut off his head, when V. suddenly appeared as a being neither man nor animal, but a man-lion of fearful aspect and size; and, after a violent struggle with the demon, killed him by tearing his heart out with his finger-nails. The son was then installed by V. as sovereign over the demons.

5. The *Vâmana*- or *dwarf*-*Avatâra*.—*Prahlâda* (above mentioned) had a grandson, *Bali*, who, having conquered Indra (q.v.), ruled over the three worlds, and filled the gods with dismay for their future. They had recourse to V., who, assuming the shape of a dwarf, humbly approached the demon king, and asked for so much ground as he could measure with three paces—a modest request which the king smilingly granted. But the dwarf strode with one pace over the earth, with a second over the intermediate space (the atmosphere), and with a third over the sky, leaving for Bali only the subterranean regions.—The Vedic conception of the three strides of V., mentioned in the beginning of this article, is doubtless the basis of this *Avatâra*.

6. The *Paras'u-Râma-Avatâra*, or V.'s incarnation as *Râma*, son of *Jamadagni*, armed with an ax (*paras'u*).—*Arjuna*, son of *Kr'itavîrya*, and king of the *Haihayas*, had obtained, as a reward for his piety, a thousand arms, and the sovereignty over the earth. The gods, frightened at his power, had recourse to V., who resolved to be born as a son of *Jamadagni*, that he might slay him. *Arjuna* came to the hermitage of *Jamadagni*, and was hospitably received by the saint, who could treat him and his followers sumptuously, as he possessed a wonderful cow of plenty, that supplied him not merely with the milk and butter required for his sacrificial offerings, but with everything else that he wished for. In spite of the kind treatment he had met, *Arjuna* carried off with him the cow and her calf. When *Râma* (V. incarnate in this form), who, on this occasion, had been absent from home, returned to his father's hermitage, and learned what had happened, he took up his ax (or his bow) and slew *Arjuna*, together with his army. The sons of *Arjuna*, to revenge his death, attacked the hermitage and killed *Jamadagni*: thereupon *Râma* made a vow to extirpate the whole *Kshattriya* or military race; and in fulfilling this vow killed the men of many generations as fast as they grew to adolescence, 'and filled with their blood the five large lakes of *Samantapanchaka*.' There can be little doubt that a historical conflict between the *Brâhman'as* and *Kshattriyas* or military caste underlies the conception of this *Avatâra*—one which has its parallel in the history of *Vasisht'ha* and *Vis'wâmitra* (q.v.).

7. The *Râmachandra*-, or, briefly, *Râma-Avatâra*.—*Râvan'a*, King of *Lankâ*, or Ceylon, a monster with ten heads and twenty arms, had, by dint of austerities, obtained from Brahman the promise that neither gods nor demons should be able to take his life. In consequence, he oppressed the whole universe: the sun dared not shine hot, or the fire burn, or the wind blow, where he stood; and the ocean, when it saw him, became motionless. The gods, thus seeing the world and their own existence endangered, implored Brahman to protect them; and he, remembering that the demon, when asking for the boon that he had granted him, omitted to include men among the beings that should not hurt him, advised the gods to pray to V. to become incarnate. This they did, and V. granted their

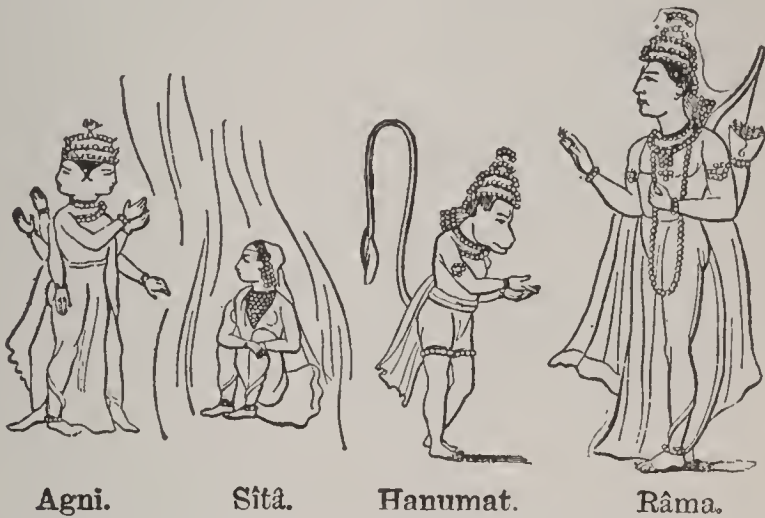


Fig. 1.—Sîtâ is seen undergoing the fire-ordeal, to satisfy the world of her chaste escape from the power of *Râvan'a*, comforted by the presence of Agni, the god of fire.—From Moor's *Hindu Pantheon*.

prayer: he became incarnate by birth from the three wives of *Das'aratha*, a king of *Ayodhyâ*, the solar line of Hindu kings—*Râma*, the son of one wife, becoming one-half of the substance of V.; the twin sons of another wife, becoming together one-fourth; and the son of the third wife one-fourth. *Râma* and his brothers performed all manner of wonderful exploits, which the legends recount in minute detail. By intrigue, *Râma's* father, in a moment of weakness, was persuaded to banish him to the forest for 14 years. This long exile of *Râma*, shared by his faithful brother *Lakshman'a*, was full of wonderful events leading to the destruction of the demon *Râvan'a*. They began with a series of conflicts which he had to sustain with the *Râkshasas*, who infested his forest abode, and which invariably ended in the destruction of these beings. *Râvan'a's* sister was one of these demons; and having fallen in love with *Râma* and being repelled by him, she, after much intrigue, persuaded her brother to carry off *Râma's* wife *Sîtâ* to his capital. *Râma* discovered his wife's fate, and attacked, conquered, and destroyed the demon—thus achieving the object of his 7th *Avatâra*. Some of the incidents of this struggle are the basis of traditions still prevalent in India—relating to the allies of *Râma*: these allies were miraculous bears and monkeys, which by their magic

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powers mainly brought about the defeat of Râvan'a and his armies, while also helping Râma to communicate with Sîtâ during her captivity. All these bears and monkeys were of divine origin, produced at the behest of Brahman by the gods for the purpose of becoming the allies of Râma: the most renowned of all, *Hanumat*, was a son of Wind: see HANUMÂN. At the end of this fierce war, Râma's exile ended, he returned to Ayodhyâ with Sîtâ, and there received back the sovereign power; and at the end of a long and glorious reign he became reunited with the splendor of Vishn'u. The story of this incarnation is briefly told in an episode of the Mahâbhârata (q.v.), and in several Purân'as; with the fullest detail in the *Râmâyan'a* (q.v.). See SANSKRIT LITERATURE: also, 'Analysis of the Râmâyan'a,' in Prof. Monier Williams's *Indian Epic Poetry*.

8. The *Kr'ishn'a-Avatâra* and *Balarâma-Avatâra*.—The former of these two, which are generally treated as one, is the most interesting incarnation of V., both for the opportunity which it affords to trace, in Hindu antiquity, the gradual transformation of mortal heroes into representatives of a god, and for the numerous legends connected with it, as well as for its influence on the Vaishn'ava cult (see VAISHN'AVAS). In the Mahâbhârata (as Dr. Muir has shown in his *Original Sanscrit Texts*, vol. IV.), Kr'ishn'a is represented sometimes as rendering homage to Siva (q.v.), and therefore acknowledging his own inferiority, or as recommending the worship of Umâ (q.v.), consort of S'iva. In some other passages he bears merely the character of a hero endowed with extraordinary powers. As the intimate ally of the Pân'du prince Arjuna (see PÂN'DAVAS), he claims the rank of the supreme deity; but there are passages in the Mahâbhârata in which the same claim of S'iva is admitted. Sometimes, moreover, in this epos Kr'ishn'a is declared to represent merely a very small portion—'a portion of a portion'—of the divine essence of Vishn'u. In the Mahâbhârata, therefore, the worship of V. in this incarnation was not generally admitted (as it is in many Purân'as of the Vishn'uit sect); nor was there, in the epic period, that consistency in the conception of a Kr'ishn'a-Avatâra traceable in the later works.—Space is lacking here for even an outline of the complex and interwoven legends of Kr'ishn'a as he appears in the Harivans'a (q.v.) and the Purân'as (q.v.). They start with the complaint of the Earth to the assembled gods concerning the frightful oppressions of the demon king *Kansa* (one of the lunar line of kings), which caused Brahman to pray to V. to relieve the distress. V. thereupon caused two of his hairs to become impersonated by birth as *Balarâma* and *Kr'ishn'a*, sons of Devakî, who in a former life had been Aditi (space personified). After many contests and intrigues of the demons, and many miraculous feats, Kr'ishn'a killed the demon king Kansa. One of his feats, especially commemorated by his worshippers, is the following, in which Balarâma always figures as the friend and ally of his more important brother, Kr'ishn'a: When sporting in Vraja, he found the cow-herds preparing for a sacrifice to be offered

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to Indra (q. v.); and he dissuaded them from worshipping this god, and directed them to address prayers and offerings to the mountain *Govardhana*. Indra, offended, sent a heavy storm, which inundated the country, and threatened to destroy the cattle: thereupon Kr'ishn'a plucked up the mountain Govardhana from its base, and held it up through seven days and nights as a large umbrella over the cow-pens, to shelter the herdsmen and their cattle from the storm; till Indra at last came to Govardhana, and worshipped Kr'ishn'a. The episode in the life of Kr'ishn'a which now ensued, and is filled with his pleasures and sports among the Gopis, or cow-herdresses, is commemorated in an annual festival in various parts of India (Oct.—Nov.), and dwelt upon in many poetical works. Of these cow-herdresses, later poets especially mention *Râdhâ*; and she is sometimes represented also as the divine or mystical love to which Kr'ishn'a returns at the end of his more worldly amours (see JAYADEVA). Later performances (but after Kansa's death) in the same line were his marriage of *Revati*; his violent abduction of *Rukmî'nî*, daughter of a king of Vidarbha, who had been betrothed to *S'is'upâla* (q. v.)—which occasioned a fierce war; and his marriage to 16,100 maidens, whom he had rescued from *Nuraka*. In other wars, Kr'ishn'a fought against S'iva (q. v.); and on the side of the Pân'd'us in their war with the Kurus (see MAHÂBHÂRATA).—For the Avatâra of V. as Balarâma, see YAMUNÂ.



Fig. 2.—Vishn'u as Nârâyan'a.—From Moor's *Hindu Pantheon*.

9. The *Buddha-Avatâra*, or V.'s manifestation as Buddha.—This is originally foreign to the cycle of the Avatâras of V., and therefore only briefly alluded to in some Purân'as—with the intention, doubtless, to effect a compromise between Brahmanism and Buddhism, by trying to represent the latter religion as not irreconcilably antagonistic to the former. See BUDDHISM.

10. The *Kalki- or Kalkin-Avatâra*.—This is yet to come, 'when the practices taught by the Vedas, and the institutes of the law, shall have ceased, and the close of the Kali or present age shall be nigh.' V. will then be born 'in the

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family of *Vishn'uyas'as* (possessing the glory of Vishn'u), an eminent Brahman of Sambhala village, endowed with the eight superhuman faculties. He will then destroy all the barbarians and thieves, and all whose minds are devoted to iniquity.'—*Vishn'u-Purân'a*.

V.'s wife is *S'rî*, or *Lakshmî* (q.v.), and his paradise *Vaikunt'ha*. When represented, he is of dark hue, with four hands, in which he holds a conch-shell, blown in battle, the *Pāñchajanya*; a disk, the *Sudars'ana*, emblem of sovereign power; a mace, the *Kaumodakî*, as a symbol of punishment; and either a lotus, as a type of creative power, or a sword, the *Nāndaka*. On his breast shines the jewel *Kaustubha*. He is variously represented—e.g., sometimes as *Nārāyan'a* (see the first *Avatâra*) when floating on the primeval waters, and resting on *S'esha*, his serpent of infinity; and there are numerous other forms.—V. is praised under a thousand names, enumerated in the *Mahābhārata*, and commented on by S'ankara and other authors.—For other myths relating to V., consult H. H. Wilson's transl. of the *Vishn'u-Purân'a*, re-edited by Fitzedward Hall (5 vols., with index, Lond. 1864-76); the first nine books of *Le Bhāgavata-Purân'a*, traduit et publié par Eugène Burnouf, I.-III. (Paris 1840-47); *Harivans'a*, traduit par A. Langlois, vols. I., II. (Paris 1834-5); and vols. I. and IV. of John Muir's *Original Sanscrit Texts* (Lond. 1858, 1863).

VISHN'U PURÂN'A: see PURÂN'A.

VISIBLE, a. *vĭz'ĭ-bl* [F. *visible*—from L. *visibilis*, visible—from *visus*, pp. of *vidēre*, to see: It. *visibile*]: that may be seen; perceivable by the eye; apparent; conspicuous. VIS'IBLY, ad. *-blĭ*. VIS'IBLENESS, n. *-bl-nēs*, or VIS'IBIL'ITY, n. *-bil'ĭ-tĭ*, state or quality of being visible or perceptible; state of being apparent. VISIBLE CHURCH, the whole body of professed believers in Christ.

VISIBLE SPEECH: system of alphabetic characters, each of which represents the configuration of the mouth which produces the sound. The system is the invention of Alexander Melville Bell (q.v.), formerly prof. of elocution in University College, London; and was published 1867, under the title *Visible Speech*. While the system has not the absolute perfection attributed to it by its inventor, it was an immense advance on any previous phonological analysis. It is indeed a *new instrument* placed in the hand of the student of phonetics.

In the system of notation the letters are formed by the combination of about 30 radical symbols, most of which are to a certain extent pictorial of the action of the organs which produce the sound. Thus a simple circle **O** represents breath issuing from the *open* throat (aspiration); while the *narrowing* of the glottis which produces vocal murmur is symbolized by **I**, from which, by modifiers to indicate guttural, palatal, 'primary,' 'wide,' etc., all the vowel-symbols are formed. Contraction in the mouth is indicated by a **C**, and the *part* of the mouth in which the contraction takes place is shown by the direction in which the symbol is turned—thus, **C** denotes contraction in the

back of the mouth (Scotch and German *ch* in *loch*), \oslash denotes lip-contraction. Complete stoppage is indicated by drawing a line across the opening, giving a symbol resembling \mathbf{D} , which turned this way would represent the sound of *p*, while \mathbf{Q} would represent *k*. The symbols for vocality, nasality, etc., are similarly incorporated into the consonant symbols. This suffices to show the two chief features of the system: (1) its simplicity and perfect consistency; (2) the correlation of the symbols. Thus, when the student has learned to recognize the symbol for *m* as differing from *b* only in the addition of the sign for emission through the nose, he is at once able to recognize and form for himself the symbols of *ng* and *n*, if he is already acquainted with those of *g* and *d*. Such a system is evidently of the highest value in all philological investigations which involve the study of sound-changes in different languages. It has been found that many phenomena of language, such as 'umlaut,' which, when formulated in the ordinary Roman type, require a long technical exposition to be made intelligible, explain themselves at once without further comment when transliterated into the V. S. symbols. A striking example of the value of V. S. in philological research is afforded by J. A. H. Murray's admirable work on the *Southern Dialects of Scotland*, in which the phonetic portion owes its clearness and exactness mainly to the use of visible speech. V. S. has been employed also by Sweet in his *History of English Sounds*; and A. J. Ellis, the father of scientific phonology in England, though employing a system of his own, constantly refers to V. S. to establish the absolute value of his symbols.

The practical applications of the system to the acquirement of the pronunciation of foreign languages, to telegraphy, to the instruction of the deaf and dumb (for which it is already largely employed), and to general elocutionary purposes, are evident: also see PHONETIC ALPHABET.

VISI^{ER}: see VIZI^{ER}.

VISI^{GOTH}, n. *vīz'î-gôth*: one of the western Goths, or that branch which finally settled in Spain and s. France, in contradistinction to the *Ostrogoths* or e. Goths (see GOTH^S). VISI^{GOTH}IC, a. *-gôth'ik*, pertaining to the Visigoths.

VISION, n. *vīzh'ăn* [F. *vision*—from L. *visiō* or *visiōnem*, sight—from *visus*, pp. of *vidēre*, to see: Skr. *vid*, to know]: the act of seeing; sight; the power or faculty of seeing; perception of external objects; that which is the object of sight; something imagined to be seen; an apparition; a spectre; a revelation from God: V. to see, as in fancy or a vision. VISI^{ONAL}, a. *-ăn-ăl*, pertaining to vision. VISI^{ONIST}, n. one who sees or believes in visions. VISI^{ONLESS}, a. *-lēs*, without sight or vision. VISI^{ONARY}, a. *ēr-î*, affected by phantoms or delusions; imaginary; of or pertaining to visions; without solid foundation: impracticable: N. a visionist; one whose imagination is idly fertile; one who forms impracticable schemes. VISI^{ONARINESS}, n. *-nēs*, the quality of being visionary or unreal; the character of a visionary.—SYN. of 'visionary, n.': enthusiast; fanatic; zealot; of 'visionary, a.': fanciful; fantastic; unreal.

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VISION: act of seeing, or that faculty of the mind by means of which, through its appropriate material organ, the Eye (q.v.), we perceive external phenomena. Considered in the latter signification, vision includes questions of high importance in relation to some of the most intricate problems of philosophy (see PERCEPTION). The present article has reference to the phenomena and laws of vision proper. In opposition to the bulk of mankind, who believe undoubtedly that they actually *see* the externality and solidity of the bodies around them, Bp. Berkeley maintained that these properties are not the immediate objects of sight at all, but are simply ideas derived originally from the touch, and erroneously attributed to vision, in consequence of their having been uniformly experienced concurrently with certain 'visible signs' (e.g., color), with which alone the sense of sight is truly conversant. This theory of vision has received the adhesion of many eminent metaphysicians.

First, as to the externality, or outness, of objects; or, which is the same thing, their distance from the eye. This, Berkeley maintains, cannot of itself and immediately be seen: 'For distance being a line directed endwise to the eye, it projects only one point in the fund of the eye; which point remains invariably the same, whether the distance be longer or shorter.' To this position, everywhere assumed by Berkeley as indisputable, and by his followers admitted to be so, it is objected that it contains an unwarranted assumption—viz., that a ray of light is, by its very nature, incompetent to convey an impression indicative of its possessing length or extension; or, to speak more accurately, it assumes that 'apparent distance' is not at all affected by a variation in the actual length of the ray intervening between the eye and the object. Yet it seems obvious that the facts of vision do not admit of our arguing the matter, as though the line extending from any point of an object to the eye were a mere mathematical abstraction. Every visible point sends forth diverging rays, which form a cone whose base is on the pupil of the eye; and to the eye the place of this visible point is at the intersection, real or virtual, of the rays in question: real, when the radiant point is viewed directly; virtual, when the rays, either by refraction or reflection, are diverted from their original path before reaching the eye. To take a case of refraction: if we notice the distance of a coin lying at the bottom of an empty vessel, we shall observe, after filling the vessel with water, a manifest diminution in the apparent distance of the coin, the reason being that the rays, on their emergence from the water, are bent outward, so that the point of their virtual intersection is brought nearer to the eye. In reflection, the place of a visible point is, in like manner, referred to the point of virtual intersection of the cone of rays incident on the pupil; and by multiplied reflections the apparent distance of a point actually adjacent to the eye may be increased to an almost indefinite degree. It is forcibly contended by Berkeley that these facts, involving geo-

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metrical considerations known only to few, and by none consciously realized in the act of vision, cannot be concerned in our appreciation of distance by the visive faculty. Yet these, and numberless similar experiments, render it evident that both 'apparent distance' and 'apparent place' are closely dependent on these geometrical conditions; and, therefore, without assuming that vision is performed by the aid of connate or instinctive geometry (a notion justly condemned by Berkeley), it yet seems highly probable that these lines and angles are the exponents and invariable concomitants of an actual operation of light on the eye, specific in its character, and—by reason of its necessarily varying, *pari passu*, with every change in the distance of the point of intersection of the visual rays—fitted to convey to us an intuitive perception of varying distance.

It is known (see EYE)—as indeed necessarily follows from optical principles—that the eye does actually undergo specific modifications, depending for their amount on the distance of the object; and there therefore seems an intrinsic probability that these distantial variations in the organ of sight are correlated to those facts of our consciousness which we denominate variations of visible (not tangible) distance; and as, furthermore, it may be demonstrated by optical experiments that the 'apparent distance' of a visible point is directly modified, to our perception, by a simple change in the mutual inclination of its diverging rays, it seems an inevitable conclusion that that agency of light which suggests to our minds differences of distance is competent to suggest distance itself.

Berkeley was quite aware of the necessary connection between the distance of an object and the divergency of the rays which it emits, though it may be doubted whether he adequately weighed the importance of the train of consequences evoked within the eye itself by this variable divergency of incidence; but he affirms that the mind is not by these means helped to a conception of distance, except so far as by experience we have found that increased divergency, carried to the extent of producing 'confused vision,' is constantly associated with diminished distance. And in proof that this association is merely accidental, Berkeley cites a curious optical experiment, as showing that where the incident rays are caused slightly to converge, instead of their suggesting, as one would expect, that the object is at an enormous distance, the result is altogether different—viz., at first, when the eye is close to the lens, and vision distinct, the object is seen at its true distance, but afterward, as the eye is gradually withdrawn, and vision becomes continually more 'confused,' the object appears enlarged in all its dimensions, and approaching nearer and nearer, until it vanishes in mere confusion from the view. 'This phenomenon,' he says, 'entirely subverts the opinion of those who will have us judge of distance by lines and angles, on which supposition it is altogether inexplicable.' To which it is replied that the explanation given by Berkeley is not the true one:

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inasmuch as it has been shown by Prof. Wheatstone that, when the dimensions of a retinal picture are continuously increased (as in the above experiment), the object appears to approach in the most evident manner.

From the doctrine of Berkeley, that the sight is not immediately perceptive of distance, it necessarily follows that the parts of a solid object will not be seen as some of them more remote than others, but as if situated all in one and the same plane: this opinion has accordingly been maintained by some who have advocated this theory; yet its unsoundness seems manifest; for if objects be originally seen, not as solid objects, but as perspective representations on a plane, then this plane must be seen either at no distance (which is absurd), or at the same distance for all objects (for which no reason and no evidence can be assigned), or at distances varying with the distances of the objects: but as the last two and only tenable suppositions assume the visual perception of distance, which is the very principle sought to be invalidated, the theory is thus shown futile and self-contradictory. If it be admitted that, by the constitution of the organ of sight in relation to light, we are perceptive of distance at all, it is in the highest degree probable, judging not only from analogy, but also from the proved distasteful affections of the eye, that we perceive by the sight degrees of distance and a perception of the latter implies, it has been shown, a perception of trinal dimensions. Now, though it is strenuously maintained by the adherents of Berkeley that this is not a primitive attribute of vision, it is not denied by any that, in the exercise of our mature sight, we do undoubtedly perceive the outness, the distance, and the trinal extension of visible objects; but, say they, these very qualities, not being modifications of light or colors, are only in appearance directly perceived by the eye; they are, in fact, the product of tactual experience, which, by long and invariable association with the phenomena proper to sight, are now instantaneously suggested by them, in a manner so intimate that the two sets of perceptions have become, to our consciousness, indissolubly one. Against this, which in effect is to affirm that we cannot see an object to be possessed of trinal dimensions until its occupancy of space is assured to us by the touch, it is maintained that we see objects to occupy space, and that what we owe to experience is a knowledge that the major part of these visible appearances have, underlying them, that which, on our making the appropriate disposition of our bodies, would produce in us tactual sensations. We say advisedly the major part; because there are many objects in nature, e.g., wreaths of smoke and vapor, which, though to the sight visibly possessed of trinal dimensions, are totally imperceptible to the touch. And this suggests the remark that a great diversity of opinion has arisen out of the ambiguous meaning of the word 'solidity,' by which those who agree with Berkeley always signify, not mere occupancy of space, which, as we have shown, may be associated with a total absence of tangible

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qualities, but also 'resistant extension' in three dimensions, which, beyond all doubt, is solely cognizable by the touch. It is, of course, in the former sense alone that it is attempted to vindicate to the sight an immediate perception of 'solidity;' and the term 'occupancy of space' is used not at all in the sense of mechanical exclusion—an idea manifestly derived from touch—but only as affirming the immediately perceived trinal extension of visible objects. Moreover, there are many substances of extreme hardness, therefore in the highest degree perceptible to the touch, which, though set in a strong light, remain quite invisible—e.g., the sheets of plate-glass used in producing 'ghost-illusions.' Indeed, strictly speaking, all *perfectly* transparent substances, and all *perfectly* reflecting (polished) surfaces, are invisible. Further, there are many appearances in nature into our perception of which there enters no element of tactual experience, even as it respects variety of surface (color, of course, being excluded from this consideration)—e.g., the waves of the sea, spread out in long undulating lines, or breaking in foam upon the shore; and all those objects which, by their minuteness and the delicate diversifications of their shape and outline, elude the cognizance of the touch: this class of facts illustrate the complete distinction and independence which subsists between the two sets of sensations, originating, respectively, with the sight and the touch—a point strongly enforced by Berkeley himself, who did not hesitate to affirm, not only that our habit of referring the two sets of sensations to the same objects is the mere effect of our having experienced them together, but that the two sets of ideas thus 'intromitted into the mind' belong, in fact, to two classes of objects, numerically distinct—the one outward, distant, and tangible; the other visible, but at no distance, and therefore, in reality, contained within the mind itself. But it has been pointed out that this very distinction, taken in conjunction with the undoubted fact that we do in maturity apprehend by the sight the distance of visible objects, furnishes strong presumption that those perceptions cannot have belonged originally to the touch. How little tactual sensations are able to modify visual perceptions has been well exemplified by the fact that 'a straight stick, with one end placed in a basin of water, would still appear to the sight to be bent at that end, after a thousand proofs by the touch that it was otherwise.' In the same way, the finger immersed in water appears 'unnaturally bent, though the experimenter feels it to be otherwise.'

The nature of 'visible' or 'apparent distance,' and how it compares with 'real distance,' will be considered in connection with apparent, as contrasted with real magnitude. We inquire, first, what are the optical conditions within the eye itself which determine our perception of the direction of a visible point. Every such point, as above remarked, radiates to the eye a cone of diverging rays, whose base is situated in the pupil of the eye; and these rays, being refracted in their passage through the eye, are brought to

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a focus on the retina, thus forming another cone, whose base is opposed to that of the incident cone, while its apex coincides with the focal point of the refracted rays. If the point of emission be placed directly before the eye, that point will be seen in the direction of the common axis of these two cones—i.e., in the optic axis; and the central point in which this axis passes through the common basis of the two cones is called the optical centre of the eye. Let us suppose, now, another visible point, a little above the first, but at an equal distance from the eye; this, too, will send forth to the eye diverging rays, which will, in like manner, be refracted to a focus on the retina at a point a little below the preceding; and the line of visible direction will pass from the point of convergence on the retina through the optical centre. Now, it is evident that the rays, by means of which we see a visible point, come to the retina from all possible directions within the limits of the cones that they collectively form. How comes it, then, that we perceive the object in only one determinate direction? The explanation usually given (founded on experiments in which a portion of the cone has been excluded without apparent change in the visible direction) is, that—by the constitution of the sense—when any point in the retina receives the apex of a cone of rays, we perceive the object in a right line extending from that point of the retina through the optical centre; or, according to other explanations, in a right line perpendicular to the surface of the retina at that point. It will, however, be more consistent with the principle that the incidence of light is accompanied by a positive action, related to its direction as well as to its other properties, if we express the law of visible direction by saying that, when a multitude of rays from all possible directions fall on a retinal point, the perceived direction is the mean or resultant of them all; which is just as true an account of the phenomena, and amounts, we think, to something more than a verbal distinction. The optical facts thus briefly indicated, if followed out with respect to all the visible points forming the objects of sight, render it evident that inverted images of the latter are formed on the retina; and the inquiry is prompted, how these can give rise to the erect vision. On consideration, an explanation of this old and much-debated ‘paradox of vision’ is found involved in the preceding statement of the law of visible direction, in whichever way that law may be expressed; and, as has been shown by previous writers, the difficulty itself has arisen solely from the assumption, contrary to fact, that our act of vision is our *seeing* the retinal pictures; whereas, considered as images, they are not even the means, but only the concomitants of that operation of light by which we see. Even this important distinction, it has been asserted, does not convey the whole truth; inasmuch as in a strict sense there is, to the one who is *seeing*, no *image* on the retina, but only a concourse of rays, which, *to the eye of another person*, will undoubtedly give the perception of an image, but cannot be proved to exist, as an image, ex-

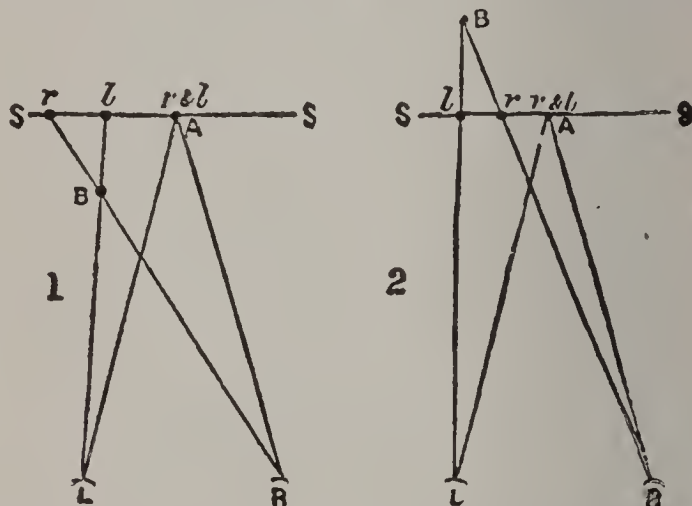
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cept in relation to this second observer. It is therefore with this reservation that the term retinal images is here used. As a consequence of all the lines of visible direction passing through the centre of the eye, it follows that, as an object recedes from or approaches the eye, its retinal image becomes proportionally less or greater; and, in like manner, the visible object itself varies in magnitude, under certain limitations, to be presently referred to, with every change in its distance. But as 'the magnitude of the object which exists without the mind continues always invariably the same,' it is evident, argues Berkeley, that 'whenever we speak of the magnitude of anything, we must mean the tangible magnitude,' which alone is measurable by 'settled stated lengths.' The sense in which this is true clearly illustrates the nature of magnitude and distance, as apprehended by the sight, in contradistinction to what is called real magnitude and real distance, the product of tactual experience. It must be understood not as imputing to the touch a superiority in mensurative capacity, but as meaning simply that by the touch we come to know that the external world is endowed with resistant qualities—such as hardness, impenetrability, and incompressibility—qualities which we cannot conceive as modifiable by our bare visual perception of them; and from this experience, it is claimed, accrues our conception of the reality and actuality of the magnitude and distance of objects, accompanied by a belief that the variability of magnitude and distance perceived by the sight is an appearance only, and dependent on conditions solely of a subjective kind. If this be a correct theory, we are not forced to deny, with Berkeley, that the objects of sight are numerically the same as those of which we are cognizant by the touch.

We pass to the concluding part of the subject—'single vision with two eyes;' in treating of which we shall have recourse to the researches of Sir Charles Wheatstone (see STEREOSCOPE). From what is stated under that title it is obvious that the question of single vision with two eyes is naturally divisible into two classes—the first including those cases in which the optic axes are parallel, and the retinal images exactly alike; the second, those in which the optic axes are convergent, and the retinal images dissimilar. Now, to see an object double is to see it in two different places at the same time; therefore, if it can be shown that by the law of visible direction an impression on corresponding points of the two retinae is necessarily referred to the same place, this will account for our single vision of the object at that spot. And on consideration it will be plain that this is really what happens when the optic axes are parallel, and the images identical. But it is evident also that this explanation does not apply to the second class of instances, in which the only visible point which depicts itself on corresponding portions of the two retinae is that point to which the optic axes are directed. All other points, whether situated before, beyond, or in the plane of the hor-

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opter,* are projected on non-corresponding points of the retinæ; and as these conditions were presumed to be inconsistent with single vision, it was asserted by Aquilonius that objects are seen single only in the plane of the horopter (it has since, with greater consistency, been said, only at the point of intersection of the optic axes): but that this is not true is evinced by our common experience that, without movement of the optic axes, we possess a certain limited field of distinct vision. Its complete refutation, however, is involved in the theory of stereoscopic vision, which may be thus explained: Let the optic axis of the right eye (R) and of the left eye (L) be converged on the point A; suppose another point, B, slightly to the left, and in advance of



A; and then through the point B draw lines from L and R respectively intersecting the plane of the horopter in *r* and *l* (fig. 1). Now, if two diagrams, SS, be prepared (one representing *l* and A, the other *r* and A), and these be presented to their appropriate eyes in the stereoscope, with the view of each eye limited to its own picture, the points *r* and *l* will be seen as a *single* point, situated not on the paper, but in advance of it, in the point of intersection of the lines of visible direction, indicated in the above construction by R*r* and L*l*. If the point B be supposed beyond A, also to the left of it, the lines drawn from L and R to B will intersect the plane of the horopter in *l* and *r* (fig. 2); and stereoscopic pictures SS prepared under these converse conditions will exhibit the points *l* and *r* as a single point placed behind A at the point of intersection of the lines drawn from L and R respectively. This simple rule involves, as it seems to us, the true principle of the stereoscope; and it is capable of being applied to the most complicated stereoscopic pictures. For, in a stereogram, let *l* and *r* stand for identical parts of the left and right pictures respectively, and suppose the pictures superposed; those parts which, read off laterally from left to right, stand in the order *lr* will recede, and those in the order *rl* will protrude (relatively to those parts of the pictures in which *r* and *l* absolutely

* The horopter is a right line drawn through the point of intersection of the optic axes parallel with a line joining the centres of the eyes; a plane drawn through this right line at right angles to the plane of the optic axes is called the plane of the horopter.

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overlie each other), when the pictures are viewed together in the stereoscope. It appears, then, that vision of the third dimension of space is directly obtained by impressions on non-corresponding retinal points; the proof of this being given in the appearance of solidity experienced in the stereoscope, though only perfectly plane representations are employed; but it would be an error to suppose that this non-correspondence is without a limit; and the question remains, to what extent the retinal points affected may be non-correspondent, consistently with single binocular vision. Without attempting any definite solution of this difficult question, it appears highly probable that this limit is determined by the same law which regulates our distinct vision of objects by means of rays inexactly focused on the retina; for, according to T. K. Abbott, 'as long as the rays are contained within the area of one sensitive minimum, the sensation will be that corresponding to the vision of a point;' and 'a certain amount of dispersion does not interfere with distinct vision.' It seems certain that the double perception experienced of the farther of two objects, when the optic axes are fixed on the nearer, or *vice versa*, can arise only when the object, thus doubled, is situated within the angle of the optic axes (whether before or beyond their intersection); for under these circumstances only, the sensitive points affected are not simply non-correspondent, but are utterly diverse, being in fact on different sides of the centres of the retina in the two eyes. That the law of projection of the various points composing the relief of a stereoscopic object is correctly stated above, is strongly corroborated by a curious experiment by Sir C. Wheatstone, in which solid objects are placed in the stereoscope, instead of pictures—e.g., two skeleton cubes so placed that, when the optic axes converge on them, identical pictures are depicted on the retinae, in which case all appearance of relief vanishes, and a perfectly plane perspective representation of a single cube is alone visible; the reason being, that the lines of visible direction for each point intersect each other, neither before nor beyond, but *in* the plane of the horopter, where, accordingly, the object is seen as a perspective projection. The same rule holds when the right and left eye pictures are interchanged, for the pictures being supposed, as before, to overlie one another, the parts *lr* become now *rl*—that is, instead of having their point of intersection beyond the plane of the horopter, they have it before that plane; and this, *mutatis mutandis*, being true of all the parts of the pictures, the stereoscopic resultant is the converse of that which would be perceived but for this abnormal arrangement. In these phenomena, named by Sir C. Wheatstone the 'conversion of relief,' the usual relations of distance also are reversed, the nearer parts being seen as farther, while the latter are perceived to be of larger dimensions than the former; and, the same principle being applied to the vision of solid objects by means of an instrument called the Pseudoscope (q.v.), also invented by Sir C. Wheatstone, they are seen as if turned inside out, and under divers other extraordinary aspects (see PSEUDOSCOPE). But, as to many

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of them, the facility of conversion is found to depend, not on the optical conditions, which of course remain invariable, but on mental conditions—e.g., previous familiarity or otherwise with the converse forms suggested; in short, on previous *visual* experience.

Passing to those cases in which the retinal pictures are identical, and the optic axes convergent, we find the law that the object is seen in the plane of the horopter: this is conclusively proved by a beautiful experiment, suggested by Sir D. Brewster. If, while looking at a wall-paper consisting of a small pattern continuously repeated at intervals not exceeding $2\frac{1}{2}$ in. from centre to centre, we cause the eyes to converge to a point in front of the wall, the paper will appear to advance to that point, and will there be plainly visible, in spite of the contradiction of the touch, which of course cannot feel the wall where it is seen; while, on the other hand, the eye can perceive no wall in the place where the touch affirms it to exist. The converse of this experiment, though more difficult to perform, is equally curious and instructive. It has also been shown by Sir C. Wheatstone, that if an increasing convergence of the eyes be unaccompanied by its usual concomitant, a corresponding enlargement of the retinal pictures, the object is seen as if continuously diminished in all its proportions, albeit the size of the retinal images remains unaltered. This experiment, which, with several others of almost equal interest and importance, may be performed by means of the stereoscope, also establishes the fact that every degree of convergence of the optic axes is associated with the particular adaptation of the eye suited for distinct vision at that distance. This adaptation is, of course, directly dependent on the divergency, less or greater, of the impinging rays; and this again stands in a necessary relation to the distance, real or virtual, of the point from which they diverge—a branch of the subject already sufficiently noticed. All observations and experiments concur in showing that a part of the highest importance is played in vision, by the convergence of the optic axes, in particular, so far as this is conjoined with a difference between the two retinal pictures: and, for this reason, there is little need for us (in our limited space) to enter on a discussion of the evidence obtained from those persons, blind from birth, who have gained their sight by means of a surgical operation; since in almost every case only one eye at a time was operated on, and the information then obtained from the patients, under circumstances of so much difficulty, is generally admitted to be dubious and unsatisfactory.

By mere modification of the light incident on the eye, the same visible objects may be seen under infinite variations of figure, situation, and magnitude; while their real figure, real situation, and real magnitude, as apprehended by the touch, remain unaltered; but these phenomena, artificially induced, argue nothing against the general fact that under normal circumstances we find, in the very place of the visible objects, those 'dynamical qualities.'

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which form the sum-total of our tactual experiences. To Berkeley is due the credit of having first pointed out the original entire disconnection and subsequent intimate blending of the two sets of experience—visive and tactual; but, if the views above set forth be correct, he erred in supposing that our realization of the geometrical proportions and relations of visible objects is dependent on the suggestions of touch, and not on the exercise of a primitive and inherent function of sight. To the popular thought, the *objects of sight* have a positive and equal existence in absolute darkness, and are simply rendered visible by the light; whereas they are, in truth, the light itself variously modified. But, in conclusion, while fully admitting that light and its modifications, viz., color in all its varieties, form the sole objects of sight, we venture to maintain that we know color only by our perception of it, as making up, by its superficial distribution, the visible form and shape of the objects of the outer world; and that this our perception of the shape, relative magnitude, and situation of visible objects is immediate, and strictly regulated by the laws of light in relation to the visual organ, irrespective of, and even in opposition to, tactual experience; but, at the same time, we hold that to the touch alone man owes his ever-present and ineradicable belief that these visible appearances have underlying them a materiality which we cannot conceive as actually modified concurrently with those changes of form and magnitude perpetually occurring in relation to our faculty of sight; therefore, in all questions which relate to real size or real distance, we necessarily have recourse in thought to those qualities of matter which are apprehensible by the touch.

That an instinctive power of direct visual perception is possessed by the young of the lower species, is not denied by any: whether a like power has been bestowed upon man, is left to the consideration of the philosophers.

See Berkeley's *Theory of Vision*; Wheatstone *On the Physiology of Vision*; Review of Berkeley's *Theory of Vision*, by Samuel Bailey; review of the last-named work by J. S. Mill, in his *Dissertations and Discussions*; *Sight and Touch*, by T. K. Abbott; Helmholtz's *Popular Lectures*; article on Vision by Sully, in *Mind*, Nos. IX. and X.

VISIT, *v. viz'it* [F. *visiter*—from L. *visitāre*, to go to see; *visĕre*, to behold—from *visus*, pp. of *vidĕre*, to see]: to go or come to see (a person, place, or thing) in the way of business, curiosity, study, ceremony, duty, friendship, etc.; to be in the habit of going to see others; to make calls; to stay with, as a guest; to inspect officially; in *Scrip.*, to reward or punish: N. act of going to see another; a temporary call at or residence in a place, or with a person as a guest; act of going to view or inspect; the attendance of a surgeon, a physician, an inspector, etc. VIS'ITING, *imp.*: ADJ. authorized to visit and inspect: N. act of going to see. VIS'ITED, pp. VIS'ITANT, *n. -ĭ-tănt*, one who visits; a visitor: ADJ. visiting. VIS'ITA'TION, *n. -tă'shăn* [F.—L.]: state of being visited; an official visit, as by a bishop; inspection; infliction of good or evil; state of suffering judicial evil. Vis'-

VISITATIONS—VISTULA.

ITOR, n., or **VIS'ITER**, n. *tér*, one who visits; one who is authorized or has a right to inspect the working or internal government of some institution or corporation—appointed usually as representative of the founder. **VIS'ITRESS**, n. *-trēs*, a female visitor. **VIS'ITATO'RIAL**, a. *-tō'rī-āl*, pertaining to one who inspects officially. **VISITING-CARD**, a name card; a name and address card.

VISITA'TIONS, **HERALDS'**: periodical circuits formerly performed by the provincial kings-at-arms in England, to take cognizance of the arms, pedigrees, and marriages of the nobility and gentry. The earliest visitation, in pursuance of a royal commission, was made by Thomas Be-nolti, Clarendieux, 1528-9: thereafter, the visitations were repeated at periods varying from 25 to 30 years: the latest commission was dated 1686, May 13, and under it some pedigrees were recorded as late as 1703-4. The records of the visitations contain a mass of historical and genealogical information of great value: they form the principal source of evidence regarding the hereditary right to bear arms in England.

VISITE, n. *vī-zēt'* [F. *visite*, a visit (see **VISIT**)]: a close-fitting garment, somewhat resembling a sleeveless jacket, used by women for outdoor wear.

VISOR, or **VIZOR**, n. *vīz'ér* [F. *visière*, a visor—from OF. *vis*, the face—from L. *visus*, pp. of *vidēre*, to see]: a mask; that part of a helmet which covered the face; it was movable and perforated for seeing and breathing; a Beaver (q.v.); a vizard or mask; a projecting piece on the front of a cap for shading or protecting the eyes: **V.** to mask. **VIS'ORED**, a. *-érd*, masked; disguised.

VISTA, n. *vīs'tā*, **VIS'TAS**, n. plu. *-tāz* [It. *vista*, view from L. *visus*, seen; *vidēre*, to see]: a view as through an avenue of trees; the rows of trees that form the avenue or walk.

VISTULA, *vīs'tū-lā* (L. *Vistula* or *Visula*, Ger. *Weichsel*, Russ. *Wisla*): important river of Austria, Poland, and Prussia; rising in Austrian Silesia, near the frontier of Galicia, in a morass in the Jablunka Mountains, 15 m. s.e. of Teschen (q.v.), 3,675 ft. above sea-level. Formed by three head-waters, the White, the Little, and the Black Vistulas, the **V.** flows n.w. a few miles to the village of Weichsel, where its course is marked by a fall of 180 ft., and thence to the town of Schwarzwasser, where it leaves the mountains. At this point the **V.** turns n.e., flowing past Cracow to its confluence with the San, 10 m. below Sandomierz forming the boundary between Galicia and Poland. From its confluence with the San, the river turns n., and enters Poland, which it traverses in a general n.w. direction, passing Lublin, Warsaw, and Lipno. Leaving Poland, it enters the kingdom of Prussia, flowing w.n.w. to its junction with the Bomberger canal; thence n.e., past Kulm and Schwetz, to Graudenz, where it turns n., and flows to its embouchure in the Baltic Sea, which it enters by several mouths. About 10 m. below Marienwerder, it throws off an arm called the Nogat, which, flowing n.e. 32 m., enters

VISUAL—VISWĀMITRA.

the Frisches Haff by about 20 mouths. The main stream continues to flow n. 115 m., dividing, however, into two branches, one of which flows into the Frisches Haff, the other into the Gulf of Danzig at Weichselmünde, 3 m. below Danzig. The V. receives from the right the Bug, the San, the Dunajec, and the Wieprz; from the left, the Pilza and Brahe. Total length 690 m.; drainage-area 72,000 sq. m. It becomes navigable for small vessels at Cracow, and for large vessels at the confluence of the San.

VISUAL, a. *vīzh'ū-āl* [F. *visuel*—from mid. L. *visūālis*, visual—from L. *visus*, sight—from *vidēre*, to see]: pertaining to sight; used in vision. **VIS'UALLY**, ad. *-lī*. **VISUALITY**, n. *vīz-ū-āl'i-tī*, the state of being visual; a view. **VISUAL ANGLE**, the angle at which an object is viewed. **VISUAL RAYS**, the beams of light which are imagined to reach the eye from the object observed.

VISWĀMITRA, *vīs-wā'mī-tra*: personage prominent in the legendary history of India; a descendant of King *Purūravas* (q.v.), who was an ancestor of Kus'ika. According to several accounts, V. was maternal uncle of Jamadagni (see **VISHN'U**—6th Avatāra). He had 100 sons, 50 of whom were, for an offense that they committed, degraded by him to become outcasts, and the progenitors of the Andhras, Pun'd'ras, S'abaras, Pulindas, Mūt'ibas, and other frontier tribes, which in the Vedas are called Dasyus, or robbers: see **VEDA**. His fame is founded chiefly on the remarkable fact that though by birth a Kshattriya, or a man of the military caste, he gained admission into the Brāhmanic caste, after a long contest with the R'ishi *Vasisht'ha* (q.v.). A kind of consecutive biography of V. is given in the first book of the *Rāmāyan'a*, . Its substance is as follows: Roaming over the earth with his armies, V. came to the hermitage of *Vasisht'ha* (q.v.), and was received by the saint in the most sumptuous style. *Vasisht'ha* could afford thus to entertain the king, because he possessed a fabulous cow of plenty, that yielded him everything that he desired (see a parallel legend in **VISHN'U**—6th Avatāra). V., becoming aware of the source of *Vasisht'ha*'s wealth, wished to possess the cow, and offered to purchase her from *Vasisht'ha*. The saint refused the offer, and the king seized her, intending to carry her off by force. But the cow resisted, and ultimately displayed her supernatural powers in producing from different parts of her body numerous peoples, by whose aid *Vasisht'ha* destroyed V.'s armies. The king then had recourse to his magical weapons, but he was defeated by those of *Vasisht'ha*; and in his humiliation he exclaimed: 'Contemptible is the might of a Kshattriya; a Brahman's might alone is might;' and to attain the rank of a Brahman he immediately resolved to practice the utmost austerities. Accordingly he went to the south, and performed severe penance for a thousand years. At the end of this period, the god Brahman appeared, and announced to him that he had become a *Rājarshi*, or royal R'ishi. Not satisfied with this degree of holiness, V. continued his austerities, and at the end of another thousand years the god Brahman conferred on him the dignity of a

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R'ishi. Not yet satisfied, he went on practicing still fiercer austerities, though interrupted by the allurements of a heavenly nymph whom the gods sent to him for that purpose: thus he attained the rank of a *Maharshi*, or great *R'ishi*. After other two thousand years of still more rigorous penance (again interrupted by the gods, as before), the gods, headed by Brahman, came to acknowledge that he had now become a Brahmarshi, or Brâhman'ic *R'ishi*; and Vasisht'ha himself was compelled to acquiescence in the result. For other legends relating to this contest, see vol. I. of Muir's *Original Sanscrit Texts* (Lond. 1858) (see also HARISCHANDRA).

VITACEÆ, *vī-tā'sē-ē*: natural order of exogenous plants (known also as *Ampelideæ* and *Sarmentaceæ*), of which the common vine may be regarded as the type. About 260 species are known, natives of warm and temperate climates. all shrubs, mostly climbing; with simple or compound leaves, with or without stipules, lower leaves opposite, upper leaves alternate; the flower-stalks racemose, opposite to the leaves, sometimes (as in the vine), by abortion, changing into tendrils.—The only plant of the order of much value, in an economical view, is the Vine (q.v.); nor are there any fine fruits except its fruit (the grape), and that of species so closely allied to it as to be probably mere varieties. Species of the genus *Cissus* and of *Ampelopsis* are sometimes planted for ornament. *Cissus antarctica* is the KANGAROO VINE of New Holland; and *Ampelopsis quinquefolia*, often called VIRGINIA CREEPER, is a frequent ornament of the fronts of houses both in America and Europe, attaching itself to the wall by tendrils terminating in a peculiar kind of sucker and climbing to a great height.

VITAL, a. *vī'tāl* [F. *vital*—from L. *vītālis*, pertaining to life—from *vita*, life: It. *vitale*]: pertaining to life; necessary to life; being that on which life depends; containing life; essential; in *OE.*, able to live. **VI'TALLY**, ad. *-lī*. **VITALITY**, n. *vī-tāl'ī-tī*, the principle of life; power of life or existence; principle of growth; animation. **VITALIZE**, v. *vī'tāl-īz*, to furnish with the principle of life; to give life to. **VI'TALIZING**, imp. **VI'TALIZED**, pp. *-īzd*. **VI'TALIZATION**, n. *-ī-zā'shūn*, the act or process of infusing the vital principle. **VI'TALIST**, n. *-īst*, one who believes that no vital phenomenon, such as digestion, can be explained on purely physical and chemical principles, but that every such action is conditioned by an unknown force, higher in its nature and distinct in kind as compared with all other forces. **VI'TALISM**, n. *-īzm*, the doctrines of the vitalist. **VITALS**, n. plu. *vī'tālz*, the inner parts of animal bodies essential to life. **VITAL FORCE**, the power or principle imparting life and growth.

VITAL STATISTICS.

VITAL STATISTICS: enumerations, registrations, computations, etc., of the number of births, marriages, diseases, deaths, in a community or in a country during a year or other period; and study of this material for the purpose of developing the death-rate, longevity, liability to disease, etc., of the population to which the tables refer. Accuracy and completeness of registration and tabulation being absolutely essential, and these requisites being in many tables of V. S. non-existent, it follows that the inductions of the compilers of the statistics are to be received with very large allowance. The health commissioners of the city of New York make as careful provision as is made anywhere in the United States for registration of the vital-statistical data: but the percentages of their statistical bureau are stultified by the fact that between the bureau's total of the city's population and the total reported by the U. S. census (1890) there is a difference of about 200,000 souls. And like causes produce like effects in other places.

In tables of vital statistics and reports of statistical bureaus are usually given detailed abstracts for each year of births, marriages, and deaths, tables of the fatal diseases, classified in combination with ages, also comments on the salient points of the year's registration. The number of births, marriages, and deaths varies with the state of trade, price of food, and the seasons, and thus furnishes a test of the condition of a nation. For the collection and discussion of such data, most civilized countries have organized bureaus, with subordinate bureaus in the several parishes, communes, cities, towns, etc. In the United States there is no central federal bureau of such statistics, and such bureaus do not exist in all of the states. But in all the principal cities the work of collecting vital statistics is more or less efficiently organized, and tables showing variations of population, deaths, births, marriages, mortality from disease, etc., are periodically compiled and published.

1. *Births.*—The direct cause of the increase of population in any country (apart from immigration) is the excess of births over deaths; and this depends plainly on the following causes: (1) on the prolificness of marriages; (2) on the proportion of persons born who live to marry; (3) on the interval between the mean age of marriage and the mean age of death. All these conditions must be favorable to show the full power of increase in action. All three have never yet, on any large scale, been found operating with maximum force: see **LIFE, MEAN DURATION OF.**

2. *Marriages.*—It seems contrary to the principles of human nature that early marriages should be united to longevity. Youthful marriages arise where the chances of the acquisition of wealth, or at least of a competence, in youth are favorable; and when these are favorable the fact seems to tell against longevity. One of the most interesting and useful points of view in which registers can be considered is the evidence which they give of the varying prevalence of the prudential check to marriage and population in different countries and places. The prudential check will

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show itself in two ways—either by the proportion of marriageable persons who are not married, or by the lateness of the average age of marrying. On the supposition of the natural prolificness of women remaining at the same point, the birth-rate will indicate the extent of prudential check in whichever of the two ways it may manifest itself. Suppose that from any cause the prudential restraint on marriage were to become weaker among any people than it had previously been, while the means of maintenance remained the same, what would happen? A corresponding increase would immediately take place in the annual mortality, and the mean duration of life would be correspondingly reduced. Hence many writers attribute the premature mortality all over the world mainly to imprudent marriages. However this may be, the death of one-half of the human race under the age of puberty certainly does not take place in virtue of any law of man's constitution, but from some disregard of its laws. It is declared that, while those who have the means of obedience under the conditions of civilized life generally greatly err, yet that such error is not, for the most part, greatly fatal to infant life; but that imprudent marriages, without proper means of support, are the main cause.

Tables to show age of marriage in the classes denominated 'wealthy' and 'poor' respectively are not obtainable for the United States. But a table of this kind has been drawn up for England, which shows a far greater number of early marriages among the poor than among the nobility in that country. In the following table the column relating to 'peers' families' gives the result of a study of the marriage statistics of the Brit. peerage for 100 years ending 1855. The other columns relate to years coincident with the close of the same period. The numbers are percentages of the total number of marriages in each class.

PROPORTION OF MARRIAGES AT DIFFERENT AGES.

Age.	Peers' families (first and later marriages).	England.	Poorer classes in e. London.	Peers' families (first marriages only).
Under 30.	53.08	75.62	85.00	65.97
30-45	33.98	19.22	14.06	31.63
45-60	9.50	4.25	0.94	2.40
60+	3.44	.91	0.00	0.00

Consanguineous marriages seem to result in an abnormal number of physical and mental defects in the offspring; yet statistical tables do not absolutely confirm that view. Official French statistics, and the researches of individual American observers, tend to show, in the children of such parentage, liability to insanity, deaf-mutism, and idiocy, and to physical complaints or deformities. Even granting the larger percentage of such mental and physical defects in the children of consanguineous marriages, it does not necessarily follow that consanguinity is of itself the cause;

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for the result may be referred to heredity, whose force is intensified when two individuals of the same heredity are united in marriage. On the whole, the lesson of tables of vital statistics is adverse to the union of cousins or persons near akin.

3. *Deaths*.—In statistical tables the death-rate (as also the birth-rate) is given in the ratio of the number of deaths (or births), to each 1,000 souls in the population, as ascertained in the next preceding official census, or as estimated from time to time by the statistical bureau. Statisticians fix the annual number of deaths in a population at 11:1,000 as the minimum: deaths in excess of that ratio are held to be due to causes that may be controlled by man. No mixed population on earth has ever reached, or for any length of time stood at, the minimum ratio: how far that ratio is receded from, or how nearly approached, in some of the world's great cities, appears from the following table, compiled 1873 for the New York board of health. For the reason indicated in the beginning of this article, this table, at least as far as it relates to the largest American city and perhaps also to other cities, exhibits the death-rate of a great number of cities with as much fidelity as could one of later date.

Cities.	Pop. (est.).	Deaths.	Deaths per 1,000 inhabi- tants.	Deaths under 5 years.	Percentage of deaths under 5 years to to- tal deaths.
New York.....	1,000,000	29,084	29·08	14,182	48·76
Philadelphia.....	775,000	15,224	19·64	6,260	42·72
St. Louis.....	440,000	8,551	19·44	4,014	46·94
Brooklyn.....	435,314	10,968	25·19	5,539	50·50
Chicago.....	400,000	9,557	23·89	5,676	59·39
Baltimore.....	305,000	7,614	24·96	2,301	30·22
Boston.....	276,500	7,869	28·46	3,289	41·79
Cincinnati.....	170,000	5,641	22·84	2,511	44·51
Buffalo.....	192,000	2,236	13·74	1,016	43·49
San Francisco.....	192,000	4,002	20·84	1,460	36·48
New Orleans.....	200,000	7,505	37·52	2,562	34·13
Cleveland.....	137,000	2,641	19·28	1,431	54·18
Pittsburgh.....	133,900	3,519	26·46	1,781	50·61
Newark.....	125,000	3,735	29·88	1,891	50·63
London.....	3,356,673	76,634	22·83	31,789	41·48
Liverpool.....	505,274	13,042	25·81	5,889	45·15
Birmingham.....	355,540	8,990	25·28	4,424	49·12
Manchester.....	354,000	10,015	28·29	4,802	48·04
Glasgow.....	514,295	14,876	28·92	6,805	46·42
Edinburgh.....	208,322	4,577	21·97	1,567	34·23
Stockholm.....	147,249	4,484	30·45	1,838	41·00
Rotterdam.....	125,893	3,963	31·48	.....	.....
Antwerp.....	153,645	3,795	24·69	1,733	45·66
Mexico.....	225,000	6,963	30·94	2,667	36·86
Montreal.....	165,000	4,954	30·02	2,986	60·27
Vienna.....	700,000	24,701	35·28	9,202	37·12
Dresden.....	179,687	6,257	34·82	3,080	47·62
Munich.....	169,400	7,705	45·48	3,589	46·58
Rome.....	243,307	8,479	34·14	2,343	30·42
Milan.....	271,135	9,272	34·19	2,852	30·75
Genoa.....	135,282	4,972	36·75	1,636	32·90
Venice.....	135,644	4,919	36·26	1,873	38·07

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Official reports of the mortality of many U. S. cities during a series of years, compiled 1890, give the following results:

Cities.	Year.	Deaths per 1,000 of pop.
Allegheny, Pa.....	1890	16·90
Atlanta, Ga.....	1889	19·87
Baltimore, Md.....	1889	19·16
Boston, Mass.....	1887	23·31
Brooklyn, N. Y.....	1889	22·80
Buffalo, N. Y.....	1889	16·62
Charleston, S. C.....	1890	27·75
Chicago, Ill.....	1889	17·48
Cincinnati, O.....	1889	20·06
Cleveland, O.....	1889	17·30
Columbus, O.....	1889	10·60
Davenport, Io.....	1888	13·60
Dayton, O.....	1890	17·25
Denver, Colo.....	1888	17·10
Detroit, Mich.....	1889	14·70
Duluth, Minn.....	1888	9·17
Hartford, Conn.....	1887	20·70
Hoboken, N. J.....	1886	25·20
Indianapolis, Ind.....	1887	14·54
Jersey City, N. J.....	1887	23·30
Kansas City, Mo.....	1890	15·30
Leadville, Colo.....	1887	10·91
Los Angeles, Cal.....	1890	13·00
Lowell, Mass.....	1890	25·03
Manchester, N. H.....	1887	19·95
Memphis, Tenn.....	1887	16·36
Milwaukee, Wis.....	1890	16·90
Minneapolis, Minn.....	1890	13·10
Mobile, Ala.....	1889	21·25
Nashville, Tenn.....	1887	23·70
Newark, N. J.....	1890	23·90
New Haven, Conn.....	1889	16·90
New Orleans, La.....	1890	26·37
Newport, R. I.....	1889	14·30
New York.....	1889	25·19
Norfolk, Va.....	1890	21·77
Omaha, Neb.....	1888	10·00
Paterson, N. J.....	1888	21·78
Philadelphia, Penn.....	1889	19·74
Pittsburgh, Penn.....	1887	22·04
Portland, Me.....	1890	17·31
Portland, Or.....	1887	10·00
Providence, R. I.....	1889	19·76
Richmond, Va.....	1890	23·13
Rochester, N. Y.....	1890	16·90
San Antonio, Tex.....	1890	17·00
San Francisco, Cal.....	1890	19·32
Savannah, Ga.....	1887	23·77
Scranton, Penn.....	1890	16·55
St. Louis, Mo.....	1889	17·78
St. Paul, Minn.....	1889	13·70
Syracuse, N. Y.....	1889	16·60
Toledo, O.....	1887	13·64
Washington, D. C.....	1890	22·25
Wilmington, Del.....	1887	19·10
Worcester, Mass.....	1890	17·64

It is hardly credible that the death-rate should have been so low as it is given for at least some of the cities in the above list—in many instances even less than the minimum, 11 per 1,000 souls in the population.

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The mortality of the United States, 1889-90, was (Indians on reservations not included) 872,944, of whom 596,055 were whites of native, and 140,075 foreign birth, and 22,501 birthplace unknown; 114,313 were colored: of the deaths among whites 264,784, were of children under 5 years; of deaths of colored persons, 41,911 were of children under 5 years. The census report gives as follows the mortality by several prevalent diseases: scarlet fever 5,060; measles 9,228; whooping-cough 8,354; diphtheria and croup 41,536; enteric fever 27,033; malarial fever 18,565; diarrheal diseases 74,576; cancer and tumors 20,978; consumption 101,645; pneumonia 76,291; puerperal diseases 11,232.

Statistics like the above (especially those relating to cities American and foreign), however accurate the data with which they are constructed—and their accuracy is at best only an approximation—are not to be taken at their face value. A highly salubrious locality, with low death-rate in its regular population, may show a very formidable death-rate in the table, should the place happen to be, e.g., a port of entry and temporary resting-place of a multitude of immigrants.—The census of 1880 recorded the total deaths from typhoid fever in this country for the year preceding as males 11,852; females 11,053—total typhoid death-rate 31·21 per 1,000 deaths reported; deaths from malarial fevers reported, males 10,276; females 9,876—rate per 1,000 deaths from all causes 27·61; consumption, deaths, 40,619 males, 50,932 females—rate 124·75 per 1,000 deaths from all causes. The deaths from accidents and injuries reported amounted to 35,932, thus distributed: burns and scalds 4,786; drowning 4,320; exposure 1,299; gunshot wounds 2,289; homicide 1,336; infanticide 40; injuries by machinery 120; railroad accidents 2,349; suicide by drowning 155, by poison 340, in other ways 1,550; sunstroke 557; other accidents and injuries 13,980.

The following table, from an official report to the Brit. govt., is designed to show the beneficial influence of sanitary drainage and pure water-supply:

Towns.	Popu-lation.	General death-rate per 10,000 inhabitants.		Typhoid Fever.		Infant Mortality.	
		Before dr'n'ge, etc.	After dr'n'ge, etc.	Before.	After.	Before.	After.
Bristol.. . . .	160,714	245·5	242	10	6·5	54	52
Leicester....	68,056	264	252	14·6	7·75	84·3	81
Merthyr	52,778	332	262	21·3	8·7	80·3	61
Cheltenham	39,693	194	185	8	4·75	40·5	37
Cardiff.....	32,954	332	226	17·5	10·5	?	?
Croydon....	30,229	237	190	15	5·5	?	?
Carlisle. . .	29,417	284	261	10	9·75	71	65·5
Macclesfield	27,475	298	237	14·25	8·5	77·5	59·7
Newport....	24,756	318	216·5	16·3	10·3	67·25	53·25
Dover.	23,108	225·5	209	14	9	47·75	16·3
Warwick....	10,570	227	210	19	9	51·25	46·75
Banbury....	10,238	234	205	16	8·5	53	45

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The next table is to similar effect: it shows the death-rate (males) of England and Wales for nearly 50 years, the number of deaths being distributed according to the ages of decedents. The rate is given in terms of so many per 1,000 of males in the population.

DEATH RATE OF ENGLAND AND WALES (MALES).

Years.	All ages.	0-5	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	75-85	85+
1841-50	23·1	71·2	9·2	5·1	7·1	9·5	9·9	12·9	18·2	31·8	67·5	148·3	312·3
1861-70	23·7	73·5	8·2	4·5	6·2	8·5	9·9	13·5	19·2	31·1	67·1	147·2	315·0
1876-80	22·1	67·0	6·3	3·4	4·9	6·7	8·7	13·4	19·8	34·9	69·4	152·2	331·6
1881-85	20·4	59·6	5·8	3·2	4·6	6·0	8·2	12·7	19·4	33·6	68·8	144·6	296·4
1886	20·3	60·3	4·6	2·8	4·3	5·6	7·6	12·0	19·3	33·5	72·8	151·3	331·2
1887	19·8	57·8	4·9	2·9	4·2	5·3	7·4	11·9	18·9	33·5	72·0	146·9	304·6
1888	18·8	52·7	4·5	2·7	4·0	5·4	7·2	11·7	19·2	32·7	71·6	141·6	298·3

In the table the rising 'expectation of life' during the period under observation is steady in nearly all the columns, but is particularly noticeable in the years of infancy and childhood. The betterment is to be referred to improved sanitation and improved life conditions, as also to the general diffusion of knowledge.

The actuaries of life insurance companies have constructed tables of mortality designed to show the expectation of life at different ages. The data on which such tables are based are the ratio of births to total pop., ratio of deaths among children in the first year of life, ratio of cases of sickness to pop., and of deaths to the living, ages of decedents, together with all other pop. statistics exhibiting changes due to emigration, immigration, etc. The following extract, from an essay by Samuel Brown, F.R.S., on *Mortality amongst American Assured Lives*, shows the 'expectation of life' at various ages, according to the computations of different actuaries:

Age.	Mutual Life of New York, Fifteen Years.	'Actuaries,' or Seventeen English Companies.	Massachusetts (1855) Tables. (Elliott's.)	Farr's English, No. 1.
20	42·8	41·5	39·9	39·9
30	36·0	34·4	34·0	33·1
40	28·9	27·3	27·9	26·6
50	21·6	20·2	21·3	20·0
60	14·6	13·8	15·0	13·6
70	8·6	8·5	9·4	8·5

Influence of Occupation.—The interesting question of the influence of different trades, occupations, and habits of life on health and mortality, will be found ably treated in A. G. Finlaison's *Report on Friendly Societies*: he gives the following table:

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Ages.	MORTALITY PER CENT. AMONG						
	Mariners.	Colliers.	Metal Miners.	Painters.	Police.	Railway Servants.	England and Wales.
20	·66	1·11	·65	.....	1·09	.....	·74
25	1·71	·77	1·76	1·55	·57	·52	·71
30	1·69	·84	·81	·88	1·35	1·18	·77
35	2·26	1·67	1·02	·87	1·77	1·00	·83
40	1·79	·96	·29	2·04	2·05	1·56	1·03
45	2·71	1·09	2·00	2·09	·68	1·63	1·21
50	2·48	1·70	1·84	2·87	6·35	1·74	1·50
60	2·79	3·96	2·61	6·06	.....	5·50	2·61

Among the mariners, a strong contrast is found to prevail between the sickness and mortality rates, the former being low, while the latter is high. The same fact is found among painters. 'The practical difference in the distribution of sickness,' says Finlaison, 'seems to turn upon the amount of the expenditure of physical force. This is no new thing, for in all ages the enervation and decrepitude of the bodily frame has been observed to follow a prodigal waste of the mental or corporeal energies. But it has been nowhere previously established upon recorded experience that the quantum of sickness annually falling to the lot of man is in direct proportion to the demands upon his muscular power. So it would seem to be, however.'

VITASCOPE—VITELLIUS.

VITASCOPE, *n.* *vī'ta-skōp* [from *L. vita*, life, and *scope*, view]: device by which pictures on kinetoscope films are enlarged and exhibited on a screen. In the mechanism there is a small lens nearest the exhibition-screen; behind this lens is a metal frame over which the picture to be reproduced is passed; behind this frame is a large lens, and back of all is a strong arc-light. The pictures to be reproduced are previously photographed for the purpose, the films containing any number of pictures, which successively unfold a panorama. As the film is made to pass, by electrical power and a series of wheels, over the frame behind the small lens, the light from the arc-lamp, passing through the large lens, where it is focused, projects the picture through the small lens upon the screen, in a highly magnified form, every detail of figure and action being repeated. A magnet suspended before the frame over which the film passes prevents the film from being melted by the focused rays of light from the arc-lamp. A small dynamo attracts this magnet when the film is set in motion by turning a current into the vitascope, the film in motion being in no danger of melting. The magnet is released and falls to its protecting place when the film again becomes stationary. If the photographs on the film are painted as they may be, the pictures produced on the screen will show corresponding colors.

VITEBSK, *vē-těbsk'*: government in w. Russia; bounded n.w. by Courland and Livonia, n.e. by the govt. of Pskov; 17,440 sq. m. The surface generally is hilly, though wooded plains, marshes, and lakes abound. The Dwina flows through V. for 466 m.; and on this river and its affluents, large quantities of timber are floated down to the port of Riga. The soil is not fertile, and the quantity of cereals grown is generally insufficient for local consumption. Flax and timber are chief articles of export. Ship-building is carried on on the Dwina; the lake-fisheries are profitable; and tanning is the most important industry. —V. is divided into 12 districts. Pop. (1897) 1,592,916.

VITEBSK': city of w. Russia, cap. of the govt. of V.; on both banks of the western Dwina; 389 m. s. of St. Petersburg, 345 w. of Moscow. It is an old town, covers a very large area, and contains many monasteries, churches, and synagogues. Manufactures are not extensive; and the trade—chiefly in grain, flax, hemp, tobacco-leaves, sugar, and timber—is carried on by Jews, who form the larger section of the population. V. is connected by railway with Düna-burg (q.v.) and Smolensk (q.v.). Pop. (1897) 65,871.

VITELLIUS, *vī-těl'ī-ŭs*, **AULUS**, Roman Emperor, 9th of the 12 Cæsars: A.D. 15, Sep. 24—69, Dec. (reigned 69, Jan.—Dec.); son of Lucius Vitellius, the prince of the sycophants who surrounded Caligula, but who, according to Tacitus, 'in his provincial administration exhibited the virtues of a former age.' Through his father's influence at court, V. became consul, A.D. 48, and afterward pro-consul of Africa, where his administration gave satisfaction. He had been a companion of Tiberius at Capræ,

VITELLIUS.

and was equally a favorite with Caligula, Claudius, Nero, and Galba, the last of whom appointed him commander of the legions in Lower Germany, thinking his intense devotion to gastronomic pleasures would effectually prevent his becoming a rival. However, V. had not been a month in his new post till he had completely gained the affections of his soldiers by his good-natured familiarity and liberality (strongly contrasting with Galba's parsimony); and 69, Jan. 3, they took him from his tent, and proclaimed him emperor. This decision was adopted by the rest of the troops in Gaul; and two armies, under Valens and Cæcina, immediately set out to secure Rome, V. following leisurely. For his contest with Otho in n. Italy, see OTHO. The adherents of his predecessor were leniently treated, except that the centurions of Otho's army were put to death—an act which greatly offended his own supporters. V.'s journey to Rome was a curious specimen of a triumphant advance, the nominal conqueror being invariably muddled with liquor, and the soldiers of his army straggling about, committing excesses of all sorts with impunity. At last he reached Rome, and without loss of time proceeded, by right of his office as Pontifex Maximus, to deify Nero. The administration was mostly in the hands of the freedman Asiaticus, though P. Sabinus (brother of Vespasian) and the two generals who had gained for V. the imperial dignity were high in authority; and the government was marked by moderation, for V. was too far sunk in debauchery to be capable of tyranny. But he was not long allowed to disgust the respectable part of the citizens of Rome; for the legions of Pannonia and Illyricum, having proclaimed Vespasian emperor, advanced into Italy under Antonius Primus. They were opposed by the Vitellian troops, commanded by Cæcina; but, through the treachery of Cæcina, gained a decisive victory near Bedriacum, and another, on the following evening, over another Vitellian army which had marched to support the first. V., at this critical period of his fortunes, did not abate his swinish indulgences; but his brother Lucius, in the south, showed more energy, and defeated Vespasian's partizans in several battles. Meantime, the soldiers, enraged at the treachery of P. Sabinus and his allies among the senators and knights, stormed the capitol and slew Sabinus. From this time Rome was a scene of unintermitting violence and bloodshed, till the troops of Primus entered the city. V. was found wandering about his palace in stupid terror, and, after being ignominiously exposed in the streets, was killed by repeated blows, his head carried about Rome, and his body thrown into the Tiber.—For a complete sketch of his private life, see Tacitus's *Historia*, ii., iii., and Dion Cassius, 65; also Suetonius, *Vit. Duodec. Cæs.*

VITELLUS—VITICULA.

VITELLUS, n. *vĭ-tĕl'ŭs* [L. *vitellus*, the yolk of an egg]: the yolk of an egg. **VITELLIN**, *vĭ-tĕl'ĭn*, the albuminous substance of the yolk of eggs. **VITEL'LINE**, a. *-ĭn*, of or pert. to the yolk of eggs; in *bot.*, of the color of the yolk of an egg.—The *Vitellus* or yolk of the egg of the domestic fowl consists of casein (forming 14 per cent.), albumen (about 3 per cent.), fats, some of which contain phosphorus (about 30 per cent.), a little grape-sugar, and mineral constituents (about 1.5 per cent.), in which there is great preponderance of potassium compounds and phosphates. Of the pigments of the yolk we know only that there is both a yellow and red pigment, and that one at least of them contains iron. As a food, the yolk is one of the most highly concentrated forms of nourishment. In pharmacy it is employed for administering substances insoluble in water (e.g., the oils and resins in form of emulsions).—See **EGG**.

VITERBO, *vĕ-tĕr'bō*: city of central Italy, prov. of Rome; 1,200 ft. above sea-level, at the foot of Monte Cincino; 42 m. n.n.w. of Rome. It is picturesquely situated amid gardens and vineyards, and inclosed by walls and towers dating from the Lombard period. The streets are well built and are paved with large lava blocks, and there are numerous elegant fountains. Its Gothic cathedral contains the tombs of several popes, and is memorable as the scene where Guy de Montfort assassinated Prince Henry, brother of Henry III. of England. Among other attractive buildings are the churches, mostly rich in works of art, the bishop's palace, and the city halls. There are many monuments of antiquity in and around the city. Alum, vitriol, and sulphur abound in the neighborhood, and exquisite wines are produced.—Pop. (1881) 15,279.

VITEX, *vĭ-tĕks*: genus of trees or shrubs of nat. order *Verbenaceæ*; the fruit a drupe, with a 4-celled stone. *V. Agnus-castus*, the **CHASTE-TREE**, native of the countries around the Mediterranean, is downy, with digitate leaves white on the back, and has an acrid fruit, whose seeds are used in Smyrna as an external application in colic. It derives its name 'chaste-tree' from the practice of Grecian matrons to strew their couches with its leaves, especially during the sacred rites of Ceres, in order to banish impure thoughts; for which purpose a syrup, made of its fruits, was also, and perhaps still is, used in convents in s. Europe, though, in reality, it has stimulating properties.—*V. Negundo*, an E. Indian species, has aromatic leaves, which are bruised and applied to the temples for relief of headache.—*V. trifolia* is another E. Indian species, whose leaves are a powerful discutient.

VITIATE, v. *vĭsh'ĭ-āt* [L. *vitĭātus*, pp. of *vitĭārĕ*, to make faulty, to spoil—from *vitĭum*, a fault]: to make less pure or perfect; to taint; to spoil; to contaminate; to impair; to invalidate. **VĪ'TIATING**, imp. **VĪ'TIATED**, pp. **VĪ'TIA'TION**, n. *-ā'shŭn*, corruption; contamination; a rendering imperfect or invalid.

VITICULA, n. *vĭ-tĭk'ŭ-lă* [L.—dim. of *vītĭs*, a vine]: in *bot.*, a trailing stem, as of a cucumber.

VITICULTURE—VITILIGO.

VITICULTURE, n. *vīt'i-kŭl tŭr* [L. *vītis*, a vine; Eng *culture*]: cultivation of the Vine (q.v.).

For the first time, the U. S. census office made, 1890, an investigation of the extent and value of the grape, raisin, and wine industries of the United States. In the report on viticulture, the area in which those industries are carried on is partitioned into 5 divisions, sub-divided into districts. The 5 divisions are: 1. The e. div., comprising about 51,000 acres in N. Y. and Penn.: in this div. are included the Keuka, Canandaigua, Ontario, Wayne, Seneca, Chautauqua co., and Hudson river districts in N. Y.; and the Erie co. dist. in Penn. 2. The middle div., 42,633 acres in Ill., Ind., and O., the last including the Islands dist. and the Euclid dist. 3. The w. div., 17,306 acres in Kan. and Mo. 4. The s. div., 17,092 acres in Ga., N. C., Tenn., and Va. 5. The Pacific div., 213,230 acres in Cal., Ariz., and N. Mex. Outside of these divisions, all other states and territories contain more than 60,000 acres in cultivation. The total area and production of vineyards 1890 was as follows:

STATES AND TERRI- TORIES.	Area in bearing vines; acres.	Area in non-bear- ing vines; acres.	Average yield of grapes per acre; tons.	Wine made; gallons.	Value of plant, land included; dollars.
Ariz	1,000	1,500	3.00	25,000	75,000
Cal. *.....	155,272	45,272	1.77	14,626,000	86,640,350
Ga.	1,938	2,154	1.33	107,663	1,227,600
Ill.	3,750	990	2.00	250,000	1,422,000
Ind.	3,850	1,000	1.75	224,590	1,455,000
Kan.	4,542	1,000	2.00	130,990	1,662,600
Mo.	10,000	1,764	2.00	1,250,000	4,605,600
N. Mex.	1,186	9,000	3.00	293,500	3,057,800
N. Y. †	43,350	7,650	1.75	2,528,250	20,400,000
N. C.	4,000	1,200	1.75	388,833	1,560,000
O.	28,087	4,956	1.80	1,934,833	13,217,200
Tenn.	1,500	600	2.50	203,333	630,000
Va.	4,100	1,600	2.00	461,000	1,710,000
The other states and territories..	45,000	15,000	2.00	1,875,000	18,000,000
Total....	307,575	93,686	....	24,306,905	155,661,150

In Tehama co., Cal., is the largest vineyard in the world, 3,800 acres, and 1,000 acres were to be added to it 1891. In the distillery of this vineyard, 1890, Apr., there were 300,000 gallons of brandy and 1,000,000 gallons of wine.

VITILIGO n. *vīt'il-i'gō* [L. *vītīlīgo*, a cutaneous eruption, lepros.]: a cutaneous disease, consisting of white patches on the skin, caused by loss of the usual coloring matter. **VITILIGOIDEA**, n. plu. *vīt'il-i-goy'dē-ă* [G. *eidos*, resemblance]: yellow patches sometimes met with round the eyelids and elsewhere on the skin.

* Raisins produced (20 lbs. to a box), 1,372,195 boxes, at \$1.60 each box.

† Includes 1,000 acres in Erie co., Penn., known as part of the Chautauqua dist. of N. Y.

VITIOUS—VITREOUS.

VITIOUS, a. *vish'ūs* [the same as VICIOUS]: in *Sec'y law*, illegal; unwarrantable, as in VITIOUS INTROMISSION, an unwarrantable interference with the movable estate of a deceased person.

VITIOUS, a. *vish'ūs*, and **VITIOUSNESS**, n. *vish'ūs-nēs*: OE. spellings of VICIOUS and VICIOUSNESS.

VITIS, n. *vī'tis* [L. *vītis*, a vine]: the typical genus of order *Vitaceæ* (q.v.).

VITORIA, *vē-tō'rē-ā*: town in n. Spain, cap. of prov. of Alava; on a gentle elevation, 70 m. w. of Pamplona, 234 n.n.e. of Madrid. The old town, the Villa-Suso, which occupies the top of the hill, consists of dark and tortuous streets; the new town is regularly laid out. There are several charming *alamedas*, or public walks, especially La Florida and El Prado. The Plaza Nueva, a square of 220 ft., was built 1791, and under its arcades is the favorite winter promenade. Brass and iron wares, earthenware candles, paper, and linen goods, are manufactured, and a brisk general trade is carried on with towns inland. The plain around is extensive and fruitful. The climate is temperate and healthful. Pop. (1900) 30,701.

Wellington gained here an important victory over the French under Joseph Bonaparte and Jourdan, 1813, June 21. The numbers in this encounter were nearly equal. The French lost 6,000 killed and wounded, 150 cannon, with baggage, eagles, and an amount of booty in pictures, etc., which amounted to \$5,000,000. The direct result of the battle was the retirement of the French from Spain. About this engagement Southey says the French 'were beaten before the town, in the town, through the town, out of the town, behind the town, and all about the town.' The combined loss of the British, Portuguese, and Spaniards was 4,900 men.

VITRÉ, *vē-trā'*: ancient town of Brittany, France, dept. of Ille-et-Vilaine; on the left bank of the Vilaine; 24 m. e. of Rennes by railway. It has preserved many features peculiar to the old towns of the middle ages, and is still surrounded with Gothic ramparts flanked with towers. At three miles' distance is the Château des Rochers, the famous residence of Madame de Sévigné. Manufactures of cloth and hats are carried on. Pop. (1896) 10,584.

VITREO-ELECTRIC: see under VITREOUS.

VITREOUS, a. *vīt'rī-ūs* [L. *vitreus*, glassy, clear—from *vitrum*, glass—from *vidēre*, to see: It. *vitreo*]: pertaining to or consisting of glass; having the lustre or aspect of glass; glassy; produced by rubbing glass, as *vitreous* electricity. **VITREOUSNESS**, n. *-nēs*, the state or quality of being vitreous. **VITRESCENT**, a. *vī-trēs'sēnt*, capable of being formed into glass; tending to become glass. **VITRES'CENCE**, n. *-sēns*, the state or quality of being vitrescent; glassiness. **VITRES'CIBLE**, a. *-sī-bī*, that can be vitrified. **VITRIC**, a. *vīt'rīk*, of or pertaining to glassy substances. **VITRIFICATION**, n. *vīt'rī-fāk'shūn* [L. *faciō*, I make]: the act or process of converting into glass by heat and fusion. **VITRIFICATION**, n. *-tūr*, the making of glass. **VITRIFY**, v. *fī*

VITRIFIED FORTS.

to convert into glass by the action of heat; to be converted into glass. VITRIFYING, imp. VITRIFIED, pp. *-fid*: ADJ. having the surface coated with, or partially converted into, glass by the action of heat. VITRIFIABLE, a. *-fī'ā-bl*, capable of being converted into glass. VITREO-ELECTRIC, a. *vit rē ō-*, exhibiting positive electricity—applied to glass when rubbed. VITREOUS ELECTRICITY, positive electricity, or that which is excited by rubbing a glass body. VITREOUS HUMOR, the globular transparent structure occupying the centre of the eyeball, being the largest of the transparent media of the eye.

VITRIFIED FORTS: remarkable stone inclosures bearing traces of the action of fire, found in various parts of Scotland, in Ireland, France, etc. They are usually on a small hill, overlooking a considerable valley, and consist of a wall inclosing a level area on the summit. The most remarkable feature is, that the wall is always more or less consolidated by the action of fire—in some cases only to the extent of giving a glassy coating to its inner side: in some instances the vitrification has been more complete, the ruins assuming the character of vast masses of coarse glass. About 50 structures of this kind are in Scotland, extending from Creich, in Sutherlandshire, to Kingarth, in the south of the isle of Bute. The largest, 750 ft. long and 150 ft. wide, is in Argyleshire; but the strongest, with walls about 8 ft. high and 20 to 30 ft. thick, is the Tap o' Noth, in Aberdeenshire. V. F. were noticed first by John Williams, in his *Account of Some Remarkable Ancient Ruins lately discovered in the Highlands and Northern Parts of Scotland* (1777). His observations led him to conclude that they were artificial structures intentionally vitrified by a partial melting of their materials. This view has been combated by others, who contend that the supposed forts were of volcanic origin—a supposition quite irreconcilable with their obviously artificial character. Samuel Hibbert, one of the secretaries of the Soc. of Antiquaries of Scotland, after careful observations, concluded that, while the structures were artificial, the vitrification was an accidental effect, which might have arisen from such causes as the frequent kindling of beacon-fires as signals of war and invasion, or of bonfires forming a part of festive or religious rejoicings. Others have held that the forts may have been built of wood and stone, and that the vitrified appearance is due not to design, but to the fusion which resulted from their having been set on fire by a besieging enemy. The view originally put forth by Williams is that now generally received, and supported by the principal British and continental authorities. Moreover, it has been found that in some cases where the most accessible materials for a stone fort are incapable of vitrification, stones more capable of being vitrified have been brought from a distance. One vitrified fort has been noted in the county of Cavan, Ireland, and four in the county of Londonderry. A single instance, the 'Camp of Péran' in Brittany, occurs in France. In this case, only the central portion, or core, of the wall is vitrified, and in it a Roman roofing-tile was found firmly

VITRINGA—VITRIOL.

attached to the melted stone. A number of the hill-forts of Bohemia have been found to be constructed with a core of vitrified stones occupying the centre of the walls.—Various signs indicate that the V. F. are not of great antiquity—perhaps even as late as the first centuries of the Christian era.—See *Archæologia Scotica*, IV.; M'Culloch's *Highlands and Western Islands of Scotland*; Burton's *History of Scotland*, chap. 3; *Proceedings Soc. Antiq. Scot.*, VIII., 145; etc.

VITRINGA, *vê-trîng'gâ*. CAMPEGIUS: eminent Dutch divine and commentator: 1659, May 16—1722, Mar. 31; b. at Leeuwarden, in Friesland. He studied at Franeker and Leyden, at which last place he received the degree D.D. in his 20th year. In 1681 he was appointed prof. of oriental languages; and two years later received the chair of theology in the Univ. of Franeker, where he died. V. is regarded as one of the most learned and laborious divines of his age, and has left many excellent and erudite works, chiefly commentaries on portions of the Scriptures, nearly all in Latin: among his works are: *Commentarius in Jesaiam*; *Anacrisis Apocalypseos Johannis Apostoli*; *Commentarius in Jeremiam*; *Commentarius in Zecharaiam*; *Vetus Synagoga*; *Dissertationes Sacræ*; *Typus Theologicæ Prophetiæ*; etc.

VITRIOL, n. *vî'rî-ôl* [F. *vitriol*; It. *vitriuolo*, *viuriol*—from L. *vitrum*, glass—from the appearance of blue and green vitriol]: sulphuric acid or one of its many compounds. VITRIOLATE, a. *-rî-ô-lât*, reduced or converted to a vitriol. VITRIOL'IC, a. *-ôl'ik*, pert. to or obtained from vitriol; of the nature of vitriol. VITRIOLINE, a. *-ô-lîn*, of or pert. to vitriol. BLUE VITRIOL, sulphate of copper. GREEN VITRIOL, sulphate of Iron (q.v.); Copperas (q.v.): it occurs in nature in small amounts—e.g., in bituminous coal-beds. RED VITRIOL, a red or flesh-colored sulphate of iron; a sulphate of cobalt. OIL OF VITRIOL, sulphuric acid—so called because of its oily appearance, and because it was obtained originally from green vitriol or copperas. WHITE VITRIOL, sulphate of zinc: see ZINC.—*Vitriol* is the name applied by the early chemists to glass-like salts, distinguishing them by their colors into blue V., green V., and white V. *Blue Vitriol* is still the popular name for sulphate of copper, which may be obtained on a large scale in various ways, but most simply by boiling copper in an iron pot with dilute sulphuric acid, by which is obtained a salt having the formula $\text{Cu}_2\text{SO}_4 \cdot 5\text{H}_2\text{O}$, and crystallizing in oblique prisms of clear blue color, which are soluble in four parts of cold and two of boiling water, and when moistened redden litmus paper. It occurs native in small quantities from decomposition of copper sulphide. In large doses it acts as a powerful irritant poison, unless, as is frequently the case, it is rejected by vomiting. In small but repeated doses (as from half a grain, gradually increased to two grains, made into pills with conserve of roses) it acts as a tonic and astringent, and will often check the discharges in chronic diarrhea and dysentery, when other medicines have failed; and according to Neligan, it has been found

VITRO DI TRINA—VITRUVIUS.

serviceable in croup by checking excessive bronchial secretion. It has been much employed in cases of epilepsy, and is a valuable remedy in chorea and other spasmodic diseases, especially when they occur in weak constitutions about the period of puberty. Its use in doses of 10 to 15 grains as an active emetic is mentioned in all works on materia medica; but sulphate of zinc, in a dose of a scruple, is as efficacious, and much safer. Externally, this salt in solution (varying from one to ten grains in an ounce of water) forms a good application to indolent ulcers, aphthæ, cancrum oris, and the sore throat in scarlatina; it is used also in chronic ophthalmia, and as an injection in cases of urethral or vaginal discharges. In the solid state it is used as a caustic to repress excessive granulations (proud flesh), to destroy warts, and to excite indolent ulcers.

Elixir of Vitriol is the old name for the aromatic sulphuric acid of the Pharmacopœia. It is a mixture of three ounces of sulphuric acid and two pints of rectified spirit, in which powdered cinnamon and ginger have been digested. Its uses in doses of 10 to 30 minims, in a wineglassful of water, are much the same as those of dilute sulphuric acid; but it is more agreeable to the taste, and sits more lightly on the stomach.

VITRO DI TRINA, *vî'trô dî tré'nâ*: beautiful kind of glass made by the Venetians in the 15th c. Its distinguishing character is a series of wave-like marks in opaque colors, but usually white, arranged more or less regularly in the substance of transparent glass.



VITRUVIAN SCROLL, *vî-trô'.* Vitruvian Scroll.
vî-an: continuous scroll-work forming a kind of cresting, used in classical architecture.

VITRUVIUS, *vî-trû'vî-ûs* (MAR'CUS VITRUVIUS POL'LIO): Roman architect and engineer, mentioned by Pliny and Frontinus, and noted as author of a famous work on architecture—*De Architectura*. From references to himself in his own work, it is inferred that he was born B.C. 76 or 80; that he received a liberal education, specially in studies for the profession of an engineer and architect; and that he was engaged in the African war B.C. 46, as superintendent of military engines. He seems to have had great repute as an architect, but not to have acquired wealth, though the patronage which Emperor Augustus was induced by his sister (probably *Octavia Minor*) to extend to him insured him comfortable subsistence. His only public work known was a basilica at Fanum. V., in his book *De Architectura*, gives as his chief reason for writing it, the danger that, in the depraved architectural taste of the time, the beauty and correctness of the pure Grecian models would be neglected. The *De Architectura* is arranged in 10 books: the *first* contains a dedication to the emperor, a general view of architectural science, hints as to the proper subjects of study for young aspirants, and directions for building cities; the *second* treats of the early history of

VITRY-LE-FRANÇOIS—VITUPERATE.

architecture, and of its materials, with a sketch of the physical theories of various philosophers; the *third* and *fourth* treat of the erection of temples, and, in connection with this, of the four orders of architecture, Ionic, Corinthian, Doric, and Tuscan; the *fifth* treats of public buildings; the *sixth*, of private houses in town or country; the *seventh*, of the finishing and decoration of private buildings; the *eighth*, of water, the mode of discovering it, of obtaining it, and of conveying it in large supply; the *ninth*, of the principles of gnomonics, rules for dialling, and other subjects physical and astronomical; the *tenth*, of machines used in building and in military warfare, of the mechanical powers, of mills, engines for raising water, odometers, etc. To each book there is a preface; and from these is gathered what little is known of his history.—V. had great influence on architecture, from the Renaissance till comparatively recent times. There have been many editions of V.; the first was published with Frontinus's *De Aquæductibus*, Rome (about 1486), Florence (1496), Venice (1497). Rude wood-cuts were introduced into various subsequent editions, and the ed. of Bode (Berl. 1800) has a vol. of plates; but the best ed., that of J. G. Schneider (Leip. 3 vols. 1807-8), is without illustrations.—See Nohl's *Index Vitruvianus*.

VITRY-LE-FRANÇOIS, *vê-trě'lēh-frông-swá'*: town of France, dept. of Marne; on the right bank of the river Marne, 128 m. e. of Paris by railway. Its first site was at Vitry-en-Perthois; but it was taken and burned by Charles V. 1544. François I. rebuilt V. on its present site, surrounded with fosses and ramparts, and erected a castle for its protection. There are manufactures of hats and cotton goods. Pop. (1881) 7,760; (1891) 8,022; (1901) 10,000.

VITTA, n. *vīt'tă*, **VITTÆ**, n. plu. *vīt'tē* [L. *vitta*, a band or fillet worn round the head]: in *bot.*, a narrow elongated receptacle of aromatic oil, occurring in the fruit of *Umbelliferæ*, appearing in transverse sections of the fruit as brown dots between the pericarp and albumen. **VIT'TATE**, a. *-tāt*, striped, as some leaves.

VITTORIA, *vīt-tō'rē-ā*: inland town of Sicily, prov. of Siracusa; 18 m. n.w. of Modica, on the Camarana. It is quite a modern town and possesses little interest. The soil of its vicinity, however, is fertile in fruits and wines; bee-culture is carried on, and an active trade in silk and cattle. Pop., about 22,000.

VITULINE, a. *vīt'ū-līn* [L. *vitulīnus*—from *vitulus*, a calf]: belonging to a calf or to veal.

VITUPERATE, v. *vī-tū'pēr-āt* [L. *vituperātus*, pp. of *vituperārē*, to inflict censure upon, blame—from *vitium*, a fault; *parārē*, to make or get ready: It. *vituperare*]: to blame; to censure; to revile. **VITU'PERATING**, imp. **VITU'PERATED**, pp. **VITU'PERA'TION**, n. *-ā'shŭn*, abuse; blame, censure. **VITU'PERATIVE**, a. *-ā-tīv*, containing blame or censure. **VITU'PERATIVELY**, ad. *-lĭ*. **VITU'PERATOR**, n. *-ā-tēr*, one who vituperates. **VITU'PERABLE**, a. *-ā-bl*, in *OE.* deserving blame; censurable.

VITUS—VIVID.

VITUS, *vī'tūs*, St., DANCE: see CHOREA.

VIVACE, a. *vī-vá'chā* [It.]: in *music*, brisk and lively.

VIVACIOUS, a. *vī-vā'shūs* [L. *vivax* or *vivācem*, long-lived—from *vivĕrĕ*, to live: It. and F. *vivace*, vivacious]: lively; sprightly and active; in *OE.*, having vigorous powers of life. VIVA'CIOSLY, ad. -lĭ. VIVA'CIOSNESS, n. -nĕs, or VIVAC'ITY, n. -vās'ĭ-tĭ, life; animation; great liveliness and sprightliness of behavior; in *OE.*, tenaciousness or length of life.—SYN. of 'vivacious': cheerful; merry; gay; jovial; mirthful; sportive; animated; jocund; light-hearted.

VIVANDIÈRE, n. *vē-vāng'dē-ār* [F.—from mid. L. *vi-vanda*, provisions (see VIAND)]: on the *continent of Europe*, especially in France, female attendant who sells provisions, liquors, etc., to the soldiery: she is attached to a regt., and wears its colors. The V. often also ministers to the sick; and she is generally respected—each corps being extremely jealous of the honor of its V., and resenting the slightest discourtesy shown to her.

VIVARIUM, n. *vī-vū'rĭ-ŭm*, VIVA'RIA, n. plu. -rĭ-ā, or VI'VARY, n. -vā-rĭ, VI'VARIES, n. plu. -vā-rĭz [L. *vivārium*, a preserve, a pond—from *vivus*, alive; *vivĕrĕ*, to live]: an inclosure, cage, reservoir, vase, etc., for keeping animals alive in their natural state; a zoological garden or park: a *vivarium* for salt or fresh water animals is called an *aquarium*; a vivarium for birds is called an *aviary*; for bees, an *apiary*; for pigs, a *piggery*; for hens, a *hennery*, etc.

VIVA VOCE, *vī'vā vō'sē* [L., with the living voice]: by word of mouth; orally.

VIVE, int. *vēv* [F. *vive*, long live, hurrah; *vivre*, to live]: long live; success to. QUI VIVE, *kē vēv* [F. *qui*, who]: who goes there?—a challenge made by a sentinel. ON THE QUI VIVE, on the alert.

VIVERRIDÆ, *vī-vĕr'ĭ-dē*: family of *Carnivora*, having the body elongated, the claws partly retractile, the pupil of the eye circular during the day, and not contracted into a vertical line, as in the *Felidæ*; and, in general, with a strong musky odor, proceeding from a secretion in a pouch near the anus. To this family belong the civet, genet, ichneumon, etc.

VIVES, n. *vīvz* [F. *avives*, the vives]: a disease in animals, especially in horses, seated in the glands under the ears; also spelled FIVES, but less correctly.

VIVIANITE, n. *vīv'ĭ-ān-ĭt* [after *Vivian*, an English mineralogist]: phosphate of iron, usually of a fine indigo blue, sometimes used as a pigment.

VIVID, a. *vīv'id* [L. *vividus*, living, animated—from *vīvus*, alive; *vivĕrĕ*, to live: It. *vivido*]: true to the life, as a description; exhibiting the appearance of life and freshness; lively; sprightly; forming brilliant images, as colors. VIV'IDLY, ad. -lĭ. VIV'IDNESS, n. -nĕs, the quality of being vivid; sprightliness; also the rare form VIVIDITY, n. *vī-vĭd'ĭ-tĭ*. SYN. of 'vivid': lucid; clear; bright; luminous; splendid; brilliant; lustrous; strong; intense; striking; quick; active.

VIVIFY—VIVISECTION.

VIVIFY, v. *vĭv'ĭ-fi* [F. *vivifier*—from L. *vivus*, alive; *facĭō*, I make]: to endue with life; to animate; to make alive. **VIVIFYING**, imp. **VIVIFIED**, pp. *-fid*. **VIVIFIC**, a. *vĭ-vĭf'ĭk*, giving life; reviving. **VIVIFICATION**, n. *vĭv'ĭ-fi-kā'shŭn*, the act of giving life. **VIVIFICATIVE**, a. *-tĭv*, tending to vivify; vivifying.

VIVIPAROUS, a. *vĭ-vĭp'ă-rŭs* [L. *vivus*, alive; *parĭō*, I produce or bring forth]: producing young alive; having young which maintain vital connection with the parent until birth in a comparatively advanced stage of development: opposed to *Oviparous* (q.v.); in *bot.*, producing young plants from a bud or seed attached to the parent plant; attached in some unusual way to the parent, as young plants. **VIVIPARITY**, n. *vĭv'ĭ-păr'ĭ-tĭ*, state or quality of being viviparous; also **VIVIPAROUSNESS**, n. *-nĕs*.—**VIVIPAROUS FISH**, term sometimes applied to a few species of fishes (see **FISHES: REPRODUCTION**) which properly are *ovoviviparous*, i.e., hatching the eggs within the ovary: an example is in the Viviparous Blenny of the British coasts: see **BLENNY**. But it is the common characteristic of a whole family of the order *Pharyngognathi*, therefore designated by the popular name Viviparous Fish, and by the scientific name *Embiotocidæ* [from the Greek, signifying *viviparous*]. The general aspect of fishes of this family is somewhat perch-like; scales cycloid, gill-covers entire; lips thick. On the n.w. coast of America from San Francisco to Sitka, species of this family are very abundant. They come into shallow water near the coasts, when the time approaches for producing their young, about midsummer. They swim in vast shoals close to the surface, and have a peculiar habit of leaping high out of the water when alarmed, of which the Indians take advantage to capture them, by striking the water violently with their paddles, and uttering yells. The terrified fish leaping out of the water, many fall into the canoes. The Indians capture these fishes also by thrusting a spear with four barbed points into the midst of a dense shoal. They can be easily taken by nets, but are not of great value for the table.

VIVISECTION, n. *vĭv'ĭ-sĕk'shŭn* [L. *vivus*, alive; *sectĭō* or *sectĭōnem*, a cutting—from *seco*, I cut]: the dissection of an animal while alive; physiological experiments on living animals. **VIVISECTIONIST**, n. *-ĭst*, one who advocates the practice of vivisection. **VIVISECTOR**, n. *-tĕr*, one who dissects animals while alive.—*Vivisection* is practiced with the view (1) of increasing physiological knowledge; (2) of confirming known facts; (3) of giving dexterity in operative surgery. Strictly V. implies only 'cutting,' but the term is now extended to include all kinds of experiments on living animals. The practice of V. can be traced back almost to the earliest periods of medicine and surgery, and was in vogue in the Alexandrian School. In recent years attention has been drawn to the systematic atrocities in the great French veterinary colleges at Alfort and Lyon. It is stated, that to teach the students at Alfort to become skilful operators, six living horses were supplied twice a week—that 64 operations were performed on each horse, and that usually four or five horses died before half the

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operations were completed—that it takes nearly two days to go through the list—and that all the old exploded operations, as well as those now practiced, were performed—and lastly, that most of these operations could have been practiced on the dead animal just as instructively. While such practices must be condemned by all right-minded persons, some have taken the extreme view that any experiments on living animals, with the object of advancing medical and surgical knowledge, are, on moral grounds, unjustifiable. Those who advocate V. point to the gains which have accrued to physiology (hence, indirectly, to the healing art) by experiments on living animals. The circulation of the blood, and the existence of the lacteals, were thus established; and nearly all our present knowledge of the functions of the nervous system has been thus obtained, and could never have been afforded by the most minute anatomical research. In consequence of the knowledge thus obtained we no longer divide a motor nerve, and thus paralyze the face, in the hope of relieving tic douloureux; while we now see our way to a more rational mode of treating epilepsy, various obscure forms of paralysis, etc. Without V. we could never have clearly understood the causes of the sounds of the heart, and without the knowledge of these the stethoscope would have been useless in the diagnosis of cardiac diseases; nor should we without V. have known anything of the true nature of that mysterious disease, diabetes. The Hunterian treatment of aneurism by ligature, which has saved hundreds of human lives, was worked out by experiments on living animals. The study of anæsthetics, which, after prolonged investigation, led to the introduction of chloroform, was unquestionably accompanied by the suffocation of many animals; but the vast amount of misery spared to humanity by the general introduction of chloroform into surgical and midwifery practice more than counterbalances the pain inflicted in the experiments. Indeed the lower animals themselves have shared in the benefit. By experiments on living animals must be sought the solution of such questions as—the best means of restoring to life persons apparently drowned; why chloroform sometimes kills; and how those suffering under apparently fatal effects can be best recovered. These and similar considerations lead the advocates of V. to the conclusion that experiments on living animals, performed—always with care to avoid needless pain—with the object of advancing medical, surgical, or toxicological knowledge, and of thereby relieving human suffering, or prolonging human life, are not only justifiable, but are a matter of duty.

The Brit. Assoc 1871 adopted the following resolutions, presented by a committee: 1. That no experiment which can be performed under the influence of an anæsthetic ought to be done without it; 2. That no painful experiment is justified for the mere purpose of illustrating a law or fact already demonstrated; 3. Whenever, for the investigation of new truth, it is necessary to make a painful experiment, every effort should be made to insure success,

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so that the suffering inflicted may not be wasted—that, therefore, no painful experiment ought to be performed by an unskilled person, or in an unsuitable place; 4. In the scientific preparation for veterinary practice, operations ought not to be performed on living animals for the purpose of obtaining manual dexterity.—For arguments for and against V. see *Vivisection: is it necessary or justifiable?* (1866); *Physiological Cruelty*—a pamphlet aiming at impartial statement of both sides (1883): also numerous articles in the *Nineteenth Century*, *Contemporary Review*, and *Fortnightly Review* (1881 and 2).

VIXEN, n. *vīks'n* [feminine of Fox, which see: Ger. *füchsinn*, a she-fox]: a she fox; a name in reproach applied to a woman; an ill-tempered, quarrelsome woman. VIX'ENISH, a. *-ish*, like a vixen; shrewish. VIXENLY, a. *vīks'n-lī*, having the temper of a vixen.

VIZ., usually pronounced *namely*, a contr. of the L. *videlicet* [*vī-dēl'ī-sēt*]: that is; namely.

VIZAGAPATAM, *vē-zū-ga-pa-tām'*: city of British India, cap. of the dist. of V., in the presidency of Madras, on a small arm of the Bay of Bengal. It has a good harbor, sheltered on the s. by a promontory 1,500 ft. high, called the Dolphin's Nose, which is separated from the town by a small river emptying into the bay at this point, and admitting at spring-tide vessels of 200 or 300 tons. V. supports a large number of schools, has a hospital and dispensary, a library and reading-room, and is the residence of a Rom. Cath. vicar apostolic. It exports grain and sugar, and manufactures silver filagree-work and ivory and horn toys.—Pop. (1881) about 30,000.

VIZARD, n. *vīz'ērd* [see VISOR]: in *OE.*, a mask; a visor: V. in *OE.*, to mask. VIZOR: see VISOR.

VIZETELLY—VLAARDINGEN.

VIZETELLY, *vîz-é-tél'î*, HENRY RICHARD: English publisher and author: 1820, June 30—1894, Jan. 1; b. London. He was prominent in founding the *Illustrated London News* (1842), and in 1843 started the *London Pictorial Times*, which he sold and became editor of the *Illustrated Times*. He opposed the newspaper stamp duty and issued his paper without the excise stamp (1855). The abolishment of this duty and of the duty on paper was largely due to his agitation and influence. In 1852 V. published for the first time in England Mrs. Stowe's *Uncle Tom's Cabin*, and later introduced to English readers the works of Longfellow and of Poe. Subsequently he became Paris correspondent of the *Illustrated London News* (1866–76) and of the *Pall Mall Gazette*. He represented Great Britain on the wine-jury of the Vienna Exposition 1873 and at Paris 1878; for services in the former case he was created Chevalier of the Order of Francis Joseph I. of Austria. He wrote several works on wine-manufacture. In 1880 he returned to publishing, and was the first in England to issue the works of Tolstoi and Zola. For the latter issue he was prosecuted by the National Vigilance Assoc., and was also warmly defended by prominent literary men. He published his reminiscences, *Glances Back through Seventy Years*, in 1893. Among his other works are *Story of the Diamond Necklace* (1867); *Berlin under the New Empire* (1879).

VIZIER, n. *vî-zêr'* [Ar. *wazīr*, a bearer of burdens, a porter, a vizier: F. *vizir*]: in *Turkey* and other *eastern countries*, a high officer of state: a councilor of state: and bestowed first as a title of honor on the chief minister of the first Abbasside caliph, 750. The dignity was introduced among the Ottoman Turks in the reign of their second sultan, Orkhan, and was confined exclusively to the sultan's prime-minister. **GRAND VIZIER**, the chief minister of the Turkish empire: conferred first by Amurath I. on his victorious general, Timur-tâsh 1386, and the prime-minister's title was then changed into *vizir-a-z'hem*, 'grand or illustrious vizier.' The title is now given, as is also that of Mujir, to all Turkish ministers of state. The political changes at the end of 1876 (by which Turkey became a 'constitutional' monarchy) have not seriously affected the dignity of Grand V., though the title was abolished 1878, that of President of the Council of Ministers being substituted. This dignity, under the old name or the new, is, after the sultan, the most important personage of the Turkish Empire, and is the head of the administration. **VIZIERIAL**, a. *vî-zê'rî-âl*, pert. to or issued by the vizier. **VIZIERATE**, n. *vî-zêr'ât* or *vîz'yér-ât*, the office of vizier.

VIZZINI, *vîl-sê'nê*: town of Sicily; prov. of Catania; 39 m. e.n.e. of Terranova, 34 m. w.n.w. of Syracuse. It is a prosperous, well-built town; and contains a number of churches.—Pop. 14,324.

VLAARDINGEN, *vlâr'dîng-én*: town of S. Holland, about 5 m. w. of Rotterdam; near the New Maas. It has a good haven and sends annually a large fleet of vessels to

VLACHS—VLADIMIR.

the herring-fishery, besides carrying on a considerable shipping-trade.—Pop. (1880) 9,520.

VLACHS, or WAL'ACHS, or WAL'LACKS: see ROUMANIA.

VLADIKAVKAZ, *vlá'dē-káv-káz'*, or WLADIKAWKAS, *vlá'dē-káv-kás'*: chief town of the prov. of Terek, Cis-caucasia, in Russia; at the foot of the main Caucasus chain, and at the opening of the valley of the Terek. It is the terminus in this direction of the Russian railway system, and is on the only carriage road through the pass to Tiflis and the south of the mountains.—Pop. (Cossacks, Armenians, and a motley representation of various Asiatic races) (1883) 32,230; (1897) 43,843.

VLADIMIR, *vlá-dē'mēr*: government of Russia: bounded e. by the govt. of Nijni-Novgorod, s.w. by that of Moscow; 18,864 sq. m. The surface is level or undulating; the soil consists chiefly of clay or sand, fertile only in exceptional spots. The principal rivers are the Oka (navigable through its course of 85 m. through this govt.) and its tributaries, of which the chief is the Kliasma, a navigable stream. Of the numerous small lakes, that of Peryaslavl (5 m. long) is remarkable for productive fisheries, and is famous in history as being the cradle of the Russian fleet—the scene of the boyhood experiments of Peter I. in navigation. After St. Petersburg and Moscow, V. is the most actively industrious govt. in the Russian empire. Of its manufactured goods, cotton-yarn and cloth, chintz and dyed goods, linen, glass, iron and brass wares, chemicals, paper, etc., amounted in value (1884) to more than 88,000,000 roubles (= \$55,000,000). The inhabitants are also much employed in painting ikons or sacred pictures, in knitting stockings used in Russia and Siberia, and in numerous other petty trades, whose total value amounted (1884) to about 63,000,000 roubles (= \$39,000,000). Hemp is successfully grown for use in local manufactures and for export to Archangel and St. Petersburg. Forests, mostly of pine, form a border round the govt.—In the 9th c. the country was inhabited by Finns; and though it was subsequently conquered and settled by the Slavonians, traces of the original inhabitants are still found. Pop. (1897) 1,570,733.

VLADI'MIR: town of Great Russia; cap. of the govt. of V.; on the high and wooded left bank of the Kliasma; 125 m. n.e. of Moscow. It was founded in the 12th c., during the ascendancy of the Dukes of Vladimir, and was the cap. of Russia till 1328. It contains many historical remains, as the Kreml; the 'Golden Gate,' built 1158; ruins of old fortifications, and many ancient churches. The ecclesiastical seminary is important. Pop. (1897) 28,315.

VLADIMIR.

VLADI'MIR (VLADIMIR SVIATOSLAVITCH): first Christian sovereign of Russia: reigned 980-1014; d. 1014. On the death of his father (972), V., though illegitimate, received Novgorod as his share of the heritage; but was driven out by Jaropolk, who had already murdered the third brother, Oleg. However, V., aided by a body of Varangians (from Scandinavia), returned and overcame Jaropolk, by whose assassination (980) he became sole ruler in Russia. Ridding himself of his dangerous allies by persuading them to take service with the Byzantine emperor, he next recovered by force from the Poles the provinces of which they had deprived his brother, and subdued the revolted tribes. Russia at this time was an ill-compacted empire; the various Slavic tribes within its boundaries acknowledged the sovereignty of the Russian princes solely by payment of tribute, and that only when the princes were powerful enough to enforce it; hence it was the custom for the princes personally or their delegates to go their regular rounds after the fashion of tax-collectors, with a large armed retinue. V. seeking to increase the central authority, erected at his cap., Kiev, the idol Perun (Thunder), the supreme divinity of the Slaves, with the images of inferior deities, Slave and Finnish. But a few years brought a remarkable change; many of V.'s subjects were Greek Christians; his mother, Olga, had become one; besides, he wished to be allied with the Byzantine imperial family; and moved by these and other reasons of personal or patriotic ambition, he resolved to turn Greek Christian. His mode of arriving at conversion and matrimony was as curious as effective; first he attacked the Byzantine Empire, then sent an embassy to Constantinople, promising peace and his conversion, in exchange for the hand of Anna, sister of Constantine IX.; threatening war in case of refusal. His demands were gladly complied with; and after his marriage and baptism at Kherson 988, he returned to Kiev, destroyed all the idols, and commanded his subjects to be baptized. They had not the slightest objection to be baptized, if their feared and admired prince wished it; and for days the Dnieper was crowded with applicants for the first testing ordinance of Christianity. It could not have been expected that a conversion managed in such a fashion would affect the manners and conduct of such an arbitrary, violent, and daring prince as V.; yet from 988 he appears to have undergone a thorough mental and moral transformation; churches were built, schools established, capital punishment was supplanted by a fine, and such excessive lenity shown to all criminals that in the interests of good government it was found necessary to remonstrate with the thoroughgoing convert. Formerly, the wisdom and valor for which he was renowned were equalled by his licentiousness, so that the chronicles had more than one reason for saying that 'he was like unto Solomon;' but the strictest chastity characterized the latter part of his life; and his charity to the poor and personal forbearance were extreme. He died three years after his wife Anna. The Russian Church has de-

VLADIMIR II.—VLEI.

creed him the epithets 'saint,' and 'equal of the Apostles.'

VLADI'MIR II. (**VLADIMIR VSEVOLODOVITCH**), sur-named *Monomachus*: grand-prince of Kiev, and Russian sovereign: 1053-1125 (reigned 1112-25): great-grandson of Vladimir Sviatoslavitch (q.v.). His father being a younger son, there seemed little chance of V.'s attaining power in his own country; and he led a band of auxiliaries to join Boleslas II. of Poland in his wars with Bohemia; gaining such renown as on his return ranked him at the head of Russian warriors. V.'s father having succeeded to the grand principality of Kiev (1078), V. used his opportunity to wrest from their lawful possessors, Smolensk, Tchernigov, and Novgorod; though some years afterward, his cousin Oleg, the dispossessed prince of Tchernigov, with aid of the Polotzee or Cumans (a Turkish nation at that time the terror of the Russians), recovered his dominion. V. having subsequently routed the Polotzee in several engagements, became so popular, that 1112 he was chosen grand-prince of Kiev. He showed eminent qualities as ruler and warrior. His reign was characterized by maintenance of internal tranquillity, improvement of old towns and building of new, and encouragement of commerce; also by his successful campaigns against the Tchudes, Poles, Polotzee, and Bolgars (a Mohammedan commercial people settled on the Volga). V.'s fame, however, rests mostly on his writings, which present an interesting picture of the internal life of Russia in the 11th c., and indicate the earnest practical influence of the newly introduced Christianity. V.'s mother was a daughter of Constantine Monomachus; and Alexis Comnenus, who wished to be on good terms with his powerful northern neighbor, is said to have sent him the crown, sceptre, and sword of his grandfather, which are still shown as such, and are employed in the coronation of the czar.

VLA'DISLAS, or **VLA'DISLAZ**, or **ULA'DISLAS**: see **LA-DISLAS**.

VLADIVOSTOK, *vlá-dē-vōs-tōk'*: town of Asiatic Russia, and the chief naval station of Russia on the Pacific; on the w. shore of the peninsula Muravioff-Amurskiy; on the Gulf of Peter the Great, in the Sea of Japan; lat. 43° 7' n.; long. 131° 55' e.; near the Korean frontier. It has one of the finest harbors in the world, has an arsenal, and is the terminus of the overland part of the telegraph by Irkutsk and Kiachta, also of the great Siberian railway. Ice-breaking steamers keep the harbor open in winter. There are large ship-building yards and dry-docks, water-works, steamship connection with ports of Japan, China and Corea, and with Seattle, U. S. The fortifications are very powerful. Pop. (1901) 30,000.

VLEI, or **VLY**, n. *vlī* or *flī* [Dut. *vlei*, a marsh]: in s. *Africa*, a marsh; a swamp; any lodgment of surface-water; a reedy, wet hollow; the stream which drains a marsh (term used in some parts of N. J. and N. Y.),

VOCABLE—VOGELWEIDE.

VOCABLE, n. *vō'kǎ-bl* [L. *vocabŭlum*, a designation, a name—from *voco*, I call: It. *vocabolo*]: a name; a word; a term. **VOCABULARY**, n. *vō-kǎb'ŭ-lēr-ŭ*, a collection of words, especially of a particular author, arranged in alphabetical order and briefly defined; a word-book; the words of a language, or the stock of words used by a particular person. **VOCAB'ULIST**, n. *-lĭst*, compiler of a vocabulary.

VOCAL, a. *vō'kāl* [F. *vocal*—from L. *vocālis*, sounding, speaking—from *vox* or *vōcem*, a voice: It. *vocale*]: having voice; consisting of or uttered by the voice; utterable by the voice; made by the voice; sounding, as if in speech. **Vo'CALLY**, ad. *-lĭ*. **Vo'CALNESS**, n. *-nēs*, the quality of being vocal. **VOCALIC**, a. *vō-kāl'ĭk*, consisting of voice or vowel sounds. **VOCALIZE**, v. *vō'kāl-īz*, to form into voice; to utter distinctly with the voice; to practice singing on the vowel sounds. **Vo'CALIZING**, imp. *-ī-zĭng*. **Vo'CALIZED**, pp. *-īzd*. **Vo'CALISM**, n. *-īzm*, vocalization. **Vo'CALIST**, n. *-ĭst* a singer as distinguished from an instrumentalist. **Vo'CALIZA'TION**, n. *-ĭ-zǎ'shŭn* [F.—L.]: the act or operation of making vocal; voice-utterance.

VOCALION, n. *vo-kǎ'lĭ-on* [from *vocal*]: a harmonium with broad reeds that have a tonal quality like that of the pipe-organ. It has charming variety and purity of tone, and approaches the organ in force and richness of sound.

VOCATION, n. *vō-kǎ'shŭn* [F. *vocation*—from L. *vocā-tus*, pp. of *vocāre*, to call]: *literally*, a call; a summons. hence, a calling or trade; employment; an occupation; **VOCATIVE**, n. a. *vōk'ǎ-tiv* [L. *vocativus*]: in *gram.*, applied to the case or form of a word in which a person or thing is addressed or invoked: thus, *domine*—meaning 'O lord,'—is said to be the vocative of the Latin word *dominus*, 'lord,' 'master.' The vocative, however, is now regarded as a noun-stem used interjectionally, and not as a true case.

VOCIFERATE, v. *vō-sĭf'ér-āt* [L. *vociferātus*, pp. of *vociferāri*, to cry aloud—from *vox* or *vōcem*, a voice; *fero*, I carry: It. *vociferare*; F. *vociférer*]: to utter with a loud voice; to exclaim; to shout; to bawl. **VOCIF'ERATING**, imp. **VOCIF'ERATED**, pp. **VOCIF'ERATION**, n. *-ā-shŭn*, violent outcry; clamor. **VOCIF'EROUS**, a. *-ér-ŭs*, clamorous; noisy. **VOCIF'EROUSLY**, ad. *-lĭ*. **VOCIF'EROUSNESS**, n. *-nēs*, the quality of being vociferous; clamorousness.—**SYN.** of 'vociferation': outcry; clamor; cry; exclamation; uproar; shouting; acclamation; tumult; bawling.

VODENA, *vō-dǎ'ná*, or **WODE'NA** ('water-town'): town of Turkey, in the vilayet of Saloniki, 46 m. w.n.w. of Saloniki. Streams of water run down the middle of all the streets. **V.** occupies the site of the anc. Edessa, early cap. of Macedonia. **Pop.** about 10,000.

VODKA, n. *vōd'kǎ* [Russ. *wodka*, *vodka*, brandy; a diminutive of *woda*, *voda*, water]: a kind of whisky obtained by distillation from rye and sometimes from potatoes, and used in Russia as an intoxicant.

VOE, n. *vō* [Icel. *vör*]: a fiord; a creek; a bay.

VO'GELWEI'DE: see **WALTHER VON DER VOGELWEIDE**.

VOGHERA—VOGUE.

VOGHERA, *vō-gā'rā*: city of n. Italy, prov. of Pavia; on a fertile elevated plain, in a district rich in vineyards, orchards, and cornfields, 24 m. e.n.e. of Alessandria by railway. The Via Emilia passes through the town, and divides it into two parts. There are several handsome squares, of which that of the Duomo is the chief; the streets are adorned with porticoes; and there is an old castle, built by Galeazzo Visconti 1372. The civic palace contains many valuable parchments and manuscripts of the 11th, 12th, and 13th c. Silks, linens, canvas, and leather are manufactured. Pop. (1881), 10,964.

VOGT, *föcht*, **KARL**, M.D.: philosopher: b. Giessen, Hesse-Darmstadt; 1817, July 5. He studied chemistry under Liebig at Giessen, then physiology and anatomy in Berne, where he graduated in medicine. He was collaborateur with Agassiz at Neuchatel, 1839-44; then spent two years in Paris, and 1847 became prof. of zoology at Giessen. He was a member of the Frankfort parliament 1848; and being implicated in the revolutionary troubles of that year, returned to Switzerland. He became prof. of geology at Geneva 1852. V. headed a scientific expedition to the North Cape 1861. In philosophy he is a materialist. One of his earlier works on anthropology—*Man, His Place in Creation and in the History of the Earth*—has been pub. by the London Anthropological Soc. His other works are numerous.

VOGUE, n. *vōg* [F. *vogue*, course of a ship—from It. *vogare*; Sp. *bogar*, to row or pull at an oar: OHG. *waga*, a wave]: the mode or fashion prevailing at any particular time; mode; custom. IN **VOGUE**, in fashion.

VOICE.

VOICE, *n.* *voys* [F. *voix*; OF. *vois*, voice—from L. *vox* or *vōcem*, a voice]: sound from the mouth; the tone or character of uttered sounds; opinion or choice expressed; a vote; language; mode of expression; command; in *gram.*, particular mode of inflecting verbs (see **VERB**): **V.** to regulate the tone of, as an organ-pipe; give utterance or expression to, as to *voice* the sentiments of the community; to declare; to rumor; to report; to vote; adjudge by acclamation. **VOIC'ING**, *imp.*: **N.** the act of giving to the pipe of an organ its proper quality of tone. **VOICED**, *pp.* *voyst*: **ADJ.** having a voice; expressed by the voice. **VOICE'FUL**, *a.* *-fúl*, sounding. **VOICE'LESS**, *a.* *-lēs*, having no voice or vote.—**SYN.** of 'voiceless': dumb; mute; speechless; silent; noiseless.

VOICE: audible sound produced by the larynx; it may be by any animal possessing that organ; while speech or articulate language is **V.** modified in the cavity of the mouth. The Larynx (*q.v.*) is the organ by which the so-called *vocal sounds* (or primary elements of speech) are produced. There are two groups of muscles, which respectively govern (1) *the pitch of the notes*, (2) *the aperture of the larynx*. Those which affect the pitch of the notes are divisible into two antagonistic sub-groups; viz., (*a*) those which depress the front of the thyroid cartilage on the cricoid, and *stretch* the vocal ligaments; (*b*) those which elevate the front of the thyroid cartilage, and *relax* the vocal ligaments; while those which control the aperture of the glottis are divisible into (*c*) those which *open* it, (*d*) those which *close* it. It is only the first of these groups, viz., the muscles which stretch or relax the vocal ligaments, that is concerned in the production of **V.** In the ordinary condition of rest, there is a wide opening between the vocal ligaments, which are in a state of complete relaxation, and the air passes freely between them. For our knowledge of the appearances presented under varying conditions by the interior of the larynx, we are indebted mainly to Prof. Czermak, inventor of the Laryngoscope (*q.v.*—see further his work on that instrument, transl. by the New Sydenham Soc. 1861). The three figures, 1, 2, 3, represent respectively



Fig. 1.—Condition of the Larynx during tranquil respiration: *e*, epiglottis; *œ*, fissure like opening of oesophagus; *c*, fold of mucous membrane bounding the opening of the glottis posteriorly.

the condition of the larynx as seen (1) during tranquil respiration, (2) during emission of the broad vocal sound **A**, (3) during emission of a high or acute sound. The movements of the arytenoid cartilages during the production of vocal sounds can be distinctly seen—the opinions previously deduced, from theory and experiments on the dead subject,

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being thus confirmed by ocular proof. As soon as we wish to utter a sound the two arytenoid cartilages raise themselves in the fold of mucous membrane which covers them, and approach one another with surprising mobility. This

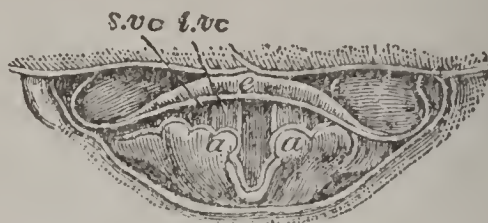


Fig. 2.—Condition of the Larynx during the emission of the broad vowel sound A:

aa, cartilages of Santorini, surmounting the arytenoid cartilages; *e*, epiglottis; *ivc*, inferior or true vocal cord; *svc*, superior or false vocal cord of left side.

movement effects the approximation of the vocal cords, and consequently the contraction of the glottis (fig. 2). It is impossible to study with the laryngoscope the mode of formation of the gravest chest-sounds, because the arytenoid cartilages become so raised that they almost come in contact with one another, while they bend under the border of the depressed epiglottis, and thus conceal the interior of the larynx. During the emission of the most acute sounds, the glottis contracts into a mere line, on each side of which the vocal cords may be recognized by their whitish-yellow color; while further outward, and separated from the former by a narrow groove, are the false or superior vocal cords of either side. The arytenoid cartilages are raised and come in contact in the median line, the epiglottis is



Fig. 3.—Condition of the Larynx during the emission of a high or acute sound:

e, epiglottis; *cu*, cushion of epiglottis; *ivc*, true vocal cord; *svc*, false vocal cord.

drawn outward, and a short stiff tube is then formed above the glottis; all these parts being, as we learn from our sensations during the experiment, in a state of very great tension. Independently, however, of such observations any one may easily prove for himself that the aperture of the glottis is much contracted during the production of sounds, by comparing the time occupied by an ordinary expiration with that required for the passage of the same quantity of air during the maintenance of a vocal sound; moreover, the size of the aperture varies with the note that is being produced; as may be readily seen by any one who compares the time during which he can hold out a low and high

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note. When the distance between the vocal cords exceeds one-tenth of an inch, no sound can be produced.

How the vocal cords produce sounds, is a question which has long attracted the attention of physiologists and physicists. To answer it, the cords have been compared with various musical instruments. The old comparison to vibrating *strings* has been proved untenable. The analogues between the organ of voice and the *flute-pipe*, in which the sound is produced by the vibration of an elastic column of air contained in a tube, have been investigated, but found to fail. The third class of instruments with which the human organ of voice has been compared are vibratory *reeds* or *tongues*, which may either possess elasticity in themselves, or be made elastic by tension. From the experiments of Weber, it appears that the action of the

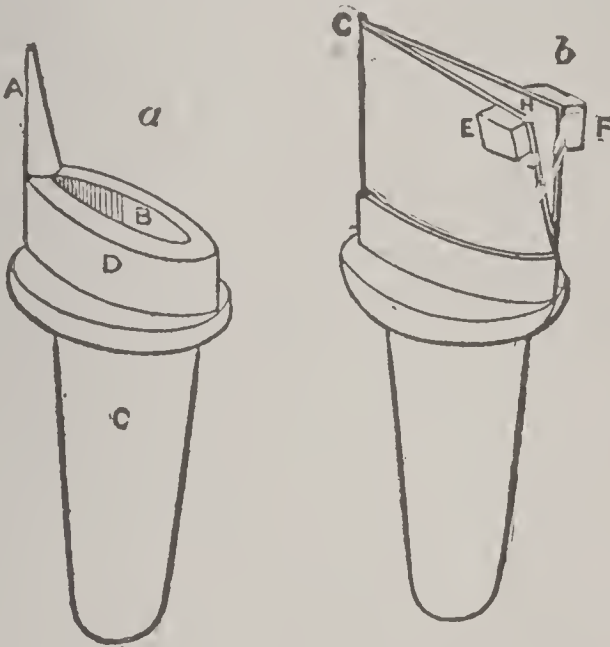


Fig. 4.

larynx has more analogy to that of *reed-instruments* than to the instruments previously named. Müller ascertained that membranous tongues made elastic by tension may have three different forms, of which the following, which alone concerns us, is one : 'Two elastic membranes may be extended across the mouth of a short tube, each covering a portion of the opening, and having a chink left open between them.' Here there is clearly an approximation to the human glottis, which may be increased by prolonging the membranes in a direction parallel to that of the current of air, so that not merely their edges but their whole planes shall be thrown into vibration. Prof. Willis has, on this principle, invented an *artificial glottis*, in which the vocal ligaments are imitated by leather, or preferably by sheet India-rubber. It is composed of a wooden pipe of the form of fig. 4, *a*, having a foot, *C*, like that of an organ-pipe, and an upper opening, long and narrow, as at *B*, with a point, *A*, rising at one end of it. A piece of leather or sheet India-rubber doubled round this point, and secured by being bound at *D* with strong thread, will

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form an artificial glottis, *b*, while its upper edges, *G*, *H*, are capable of vibrating or not by inclining the planes of the edges. Two pieces of cork, *E* and *F*, are glued to the corners to make them more manageable. From this machine various notes may be obtained by stretching the edges of the leather in the directions of their length, *G*, *H*. The scale of notes yielded by leather is much more limited than that yielded by India-rubber; and other observers have found that the middle coat of the arteries in a moist state (as being more elastic, and almost identical in structure with the vocal ligaments) yields more satisfactory results even than India-rubber. 'It is worthy of remark,' as Dr. Carpenter observes, 'that in all such experiments it is found that the two membranes may be thrown into vibration, when inclined *toward* each other in various degrees, or even when they are in parallel planes, and their edges only approximate; but that the least inclination *from* each other (which is the position the vocal ligaments have during the ordinary state of the glottis) completely prevents any sonorous vibrations from being produced.'—The *pitch* of the notes produced by membranous tongues may be affected in various ways (as by increasing the strength of the blast, the addition of a pipe, etc.), and is governed mainly by their degree of tension, while the foregoing statements show that the sound of the voice is the result of the vibrations of the vocal ligaments which take place according to the same laws with those of elastic tongues generally. Little is, however, known with certainty regarding the mode and degree in which the tones are modified by the shape of the air-passages generally, the force of the blast of air, and other circumstances.

The *false* *setto* is a peculiar modification of voice, differing from the ordinary or *chest* *voice* not only in the higher pitch of the notes, but also in their quality. The theory of its production is still a question into which we have not space to enter, further than to remark that, according to Prof. Wheatstone, false *setto* notes are to be explained by supposing that 'the column of air in the trachea may divide itself into *harmonic lengths*, and may produce a *reciprocation* of the tone given by the vocal ligaments.'

The pressure of the air within the trachea during the production of voice is very considerable. From observations by Cagniard-Latour on a man with a fistulous opening in the trachea, it was found that, when the patient called out at the top of his voice, the pressure was equal to that of a column of water 38 inches in height; when he spoke at his usual pitch, to one of 5 inches; and when he sang in a high note, to one of about 8 inches. The glottis has been well chosen by Dr. Carpenter to illustrate the minute precision with which the degree of muscular contraction can be adapted to the desired effect. The musical pitch of the tones produced by it is, as we have shown, regulated by the degree of tension of the elastic vocal ligaments. Their average length in a state of repose is $\frac{17}{100}$ of an inch; while in the state of greatest tension it is about $\frac{9}{100}$ —the difference being thus *one-fifth* of an inch;

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while in the female the respective lengths are $\frac{51}{100}$ and $\frac{49}{100}$ respectively—the difference being thus about *one-eighth* of an inch. Now, the natural compass of the voice, in persons who have cultivated the vocal organ, is about two octaves or 24 semitones. Within each semitone an ordinary singer could produce at least ten distinct intervals (the celebrated Madame Mara could sound 100 different intervals between each tone, the compass of her voice being 21 tones), so that 240 is a very moderate estimate of the number of different states of tension of the vocal cords, every one of which can be produced at will; and the *whole* variation in the length of the cord being not more than one-fifth of an inch, even in man, the variation required to pass from one interval to another will not be more than $\frac{1}{2500}$ of an inch (while in such a case as that of Madame Mara the distance would be reduced to $\frac{1}{7500}$ of an inch).

In the production of vocal sounds, the delicate adjustment of the muscles of the larynx, which is requisite to the evolution of determinate tones, is directed by the sense of hearing, being originally learned under the guidance of the sounds actually produced, but ‘being subsequently effected voluntarily, in accordance with the mental conception of the tone to be uttered, which conception cannot be formed unless the sense of hearing has previously brought similar tones to the mind. Hence it is that persons who are born *deaf* are also *dumb*. They may have no malformation of the organs of speech, but they are incapable of uttering distinct vocal sounds, or musical tones, because they have not the guiding conception, or recalled sensation, of the nature of these. By long training, however, and by imitative efforts directed by muscular sensations in the larynx itself, some persons thus circumstanced have acquired the power of speech: but the want of a sufficiently definite control over the vocal muscles is always very evident in their use of the organ.’—A fund of interesting matter in connection with this subject is in Dr. Kitto’s *Lost Senses*. Although not born deaf, he became *completely* so in early childhood, in consequence of an accident. His voice became similar to that of a person born deaf and dumb and taught to speak. It was observed that the words which he had been accustomed to use before his accident were still pronounced as they had been in childhood, the muscular movements concerned in their production having been still guided by the original auditory conception, while all the words subsequently learned were pronounced according to the spelling.

The various muscular actions concerned in the production of vocal tones are commonly regarded as being under the influence of the will. It is, however, easy to show that this is not the fact. We cannot, by simply *willing* to do so, raise or depress the larynx, or move one cartilage of it toward or from another, or extend or relax the vocal ligaments; though ‘we can readily do any or all of these things by an act of the will, exerted for a specific purpose. We conceive of a tone *to be* produced, and we *will* to produce it; a certain combination of the muscular actions of

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the larynx then takes place, in most exact accordance with one another, and the predetermined tone is the result. This anticipated or conceived sensation is the guide to the muscular movements, when as yet the utterance of the voice has not taken place; but while we are in the act of speaking or singing, the contractile actions are regulated by the present sensations, derived from the sounds as they are produced.' From these remarks, in which Dr. Carpenter has placed a very difficult subject in as clear a light as the subject admits, it follows that the muscular actions concerned in the production and regulation of the voice are due to an *automatic* impulse, similar to what occurs in the movements of the eyeball, and in many other cases that might be adduced. There cannot be a doubt that the simple utterance of sounds is in itself an instinctive action; though the combination of these sounds into music, or into articulate language, is a matter of acquirement.

Having explained the way in which the larynx produces those *tones* of which the voice fundamentally consists, and the sequence of which becomes *music*, we come to the subject of *speech*, which consists in modification of the laryngeal tones by other organs superior and anterior to the larynx (as the tongue, the cavity of the fauces, the lips, teeth, and palate, with its velum and the uvula acting as a valve between the throat and nostrils), so as to produce those *articulate sounds* of which language is formed. The organ of voice is thus capable of forming a large number of simple sounds, which may be combined into groups, forming words. Vocal sounds are divided into vowels and consonants. When a vowel is pronounced, what happens? This question is thus answered by Max Müller: 'Breath is emitted from the lungs, and some kind of tube is formed by the mouth, through which, as through a clarinet, the breath has to pass before it reaches the outer air. If, while the breath passes through the vocal cords, these elastic *laminæ* are made to vibrate periodically, the number of their vibrations determines the pitch of our voice, but it has nothing to do with its *timbre*, or vowel. What we call vowels are neither more nor less than the qualities, or colors, or *timbres* of our voice, and these are determined by the form of the vibrations, which form, again, is determined by the form of the buccal tube.'—*Lectures on the Science of Language*, 2d series, p. 116. This writer enters fully into the various configurations of the mouth requisite for formation of the different vowels (the vowels are all understood to be pronounced as in Italian): (1) In pronouncing *u* we round the lips, and draw down the tongue, so that the cavity of the mouth assumes the shape of a bottle without a neck. (2) If the lips be opened somewhat wider, and the tongue be somewhat raised, we hear the *o*. (3) If the lips be less rounded, and the tongue somewhat depressed, we hear the *æ* of the northern languages (as in *august*). (4) If the lips be wide open, and the tongue in its natural flat position, we hear *a*. (5) If the lips be fairly open, and the back of the tongue

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raised toward the palate, the larynx being raised at the same time, we hear the sound *e*. (6) If we raise the tongue higher still, and narrow the lips, we hear *i*. The buccal tube here represents a bottle with a very narrow neck, of no more than six centimetres (or about two inches and a quarter) from palate to lips. Diphthongs arise when, instead of pronouncing one vowel directly after another with two efforts of the voice, we produce a sound *during* the change from one position to the other that would be required for each vowel. Though the tube of the mouth thus modified by the tongue and lips is the chief agent in the production of vowels, Czermak has proved that the *velum palati* is changed in position with each vowel, and that it is lowest for *a*, and rises successively with *e*, *o*, *u*, and *i*, when it reaches its highest point. He found likewise that the cavity of the nose is more or less opened during the pronunciation of certain vowels. Languages might have been formed entirely of vowels, but the existing words consisting solely of vowels, show how unpleasant such languages would have been. Something else was obviously wanted to supply what Max Müller happily terms *the bones of language*—viz., the consonants. These are commonly divided into (1) those which require total stoppage of the breath at the instant previous to their being produced, and which cannot, therefore, be prolonged; (2) those in pronouncing which the interruption is partial, and which, like the vowel sounds, can be prolonged at pleasure. The former are termed *explosive*, and the latter *continuous*, consonants. In pronouncing the *explosive* consonants, the posterior openings of the nostrils are completely closed, so as to prevent the passage of air through the nose; and the current may be checked in the mouth in three ways—(a) by the approximation of the lips; (b) by the approximation of the point of the tongue to the front of the palate; (c) by the approximation of the middle of the tongue to the arch of the palate. The letters *b* and *p* are pronounced by the first of these modes; *d* and *t* by the second; and *g* (hard) and *k*, sounded as *key*, by the third; the difference between *b*, *d*, and *g*, on the one hand, and *p*, *t*, and *k*, depends on the approximating surfaces being larger, and the breath being sent through them more strongly at the moment of opening in the former than in the latter group. The *continuous* consonants may be subdivided into three classes, according to the degree of freedom with which the air is allowed to escape, and the compression which it consequently experiences. In the *first* class, no air passes through the nose, and the parts of the mouth that produce the sound are closely approximated, so that the compression is considerable. This is the case with *v* and *f*, *z* and *s*, *d* and *t*, *th*, *sh*, etc., the movement of the tongue also being concerned in production of several of these sounds. In the *second* class, including *m*, *n*, *l*, *r*, the nostrils are not closed; consequently the air is scarcely at all compressed. In pronouncing *m* and *n*, the breath passes through the nose alone; *m* is a labial, like *b*, but the latter is formed with the nose closed. Hence the passage

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of *m* to *b* (as in *lamb*) is easy; so is that from *n* to *l*, or from *n* to *g*, as is seen in the frequent combination of *nl* and *ng* in most languages. The sounds of *l* and *r* (letters which Max Müller places in a special group under the name of Trills) are produced, according to Helmholtz, as follows: 'In pronouncing *r*, the stream of air is periodically entirely interrupted by the trembling of the soft palate, or of the tip of the tongue; and we then get an intermittent noise, the peculiar jarring quality of which is produced by these very intermissions. In pronouncing *l*, the moving soft lateral edges of the tongue produce, not entire interruptions, but oscillations in the force of air.'—The *third* class contains sounds which scarcely deserve to be called consonants, since they are merely *aspirations*, either simple, or modified by an elevation of the tongue, causing a slight obstruction to the passage of air, and an increased resonance in the back of the mouth. The present *h* and the Greek *χ* are examples of these sounds. The method of pronouncing these sounds is fully discussed in Max Müller's Lectures, 2d series, pp. 127–136.

For further details, see the chapter on 'Voice and Speech' in Carpenter's *Human Physiology*; and Max Müller's *Lectures on the Science of Language* (both largely used in this article): also works of Funke, Helmholtz, Brücke, Czermak, Du Bois Reymond, etc., mentioned by Max Müller in his chapter on 'The Physiological Alphabet.'

VOID, a. *voyd* [OF. *voida*, *vuide*; F. *vide*, empty, waste—from L. *viduus*, empty, bereaved]: empty; not occupied with any visible matter; having no legal or binding force; null; unoccupied; clear, as of offense; destitute, as of understanding; in *OE.*, unsubstantial; unreal: N. an empty space; vacuum; vacancy: V. to quit; to leave empty; to empty; to vacate; to evacuate or be evacuated; to send out; to emit; to pour out; to render of no effect. **VOID'ING**, imp. **VOID'ED**, pp.: **ADJ.** in *her.*, pierced so as to show the field. **VOID'ABLE**, a. -*ä-bl*, that may be made of no effect; that may be evacuated. **VOID'ANCE**, n. -*äns*, act of emptying; ejection; vacancy, as of a benefice. **VOID'ER**, n. -*ér*, one who or that which voids; in *OE.*, a basket for broken meat. **VOID'NESS**, n. -*nës*, emptiness; nullity; inefficacy. **TO MAKE VOID**, to render of no effect; to transgress.—**SYN.** of 'void, a.': destitute; devoid; vacant; hollow; wanting; unfurnished; unsupplied; vain; ineffectual; vacated.

VOIRE DIRE, *vwâr dêr* (L. *veritatem dicere*), in Law: preliminary examination of a witness as to his competency. When a witness is supposed liable to objection for incompetency or otherwise, he is sworn first not in the cause, but on the *voire dire*—that is, to answer questions relating to this incompetency; and if it thus becomes apparent that he is incompetent, he is discharged without further examination.

VOIRON, *voâ-rông'*: town of France, dept. of Isère; on the Morge (tributary of the Isère); 15 m. by railway n.w. of Grenoble. Among the manufactures actively carried on here are blacksmiths' work, paper-making, nail-making, tanning, and making a kind of cloth named from the town (*toile de Voiron*).—Pop. (1886) 8,575.

VOITURE, *voâ-tür'*, **VINCENT**: poet and letter-writer: 1598–1648, May 26; b. Amiens, France. He made his literary studies in Paris, then entered the service of Gaston, Duke of Orleans, and with him made a tour in Spain. He won the friendship of Cardinal Richelieu by his epistle on the taking of Corbie, esteemed his *chef-d'œuvre*. He was made chamberlain by the king 1638. His poems mostly are *chansons* and *rondeaux*. More famous than his verses are his letters, in which French prose style was brought to a degree of finish never before reached. The first ed. of V.'s *Œuvres* appeared at Paris 1650; new revised editions with annotations have been issued by Roux, 1856, and by Ubicini, 1856; a separate revised ed. of the *Lettres* was published by Uzanne, 1856.

VOLAILLE, n. *võ-lā'ĩ* [F.]: in *cook.*, chicken; fowl. **SUPRÊME DE VOLAILLE**, the white meat of the breast.

VOLANT, a. *võ'lānt* [F. *volant*—from L. *volans* or *volan'tem*, flying; *volārē*, to fly: It. *volante*]: passing through the air as if upon wings; flying; nimble; in *her.*, a bird represented as flying bendways toward the dexter side of the shield.

VOLAPÜK, *võ-lá-pük'* [*vol*, world; *pük*, language]: new universal language; invented 1879, first published 1881, by J. Martin Schleyer, Rom. Cath. priest, the 'German polyglot,' b. Ober-Lauda, Baden. The so-called roots are mostly nouns from the Romance or Germanic languages: the words borrowed from other languages are in many instances unchanged—e.g., L. *sol*, sun; Eng. *son*, son: unimportant letters or syllables are often dropped—e.g., Eng. stand, *stan*; Eng. origin, *rig*. Derivatives add suffixes or prefixes—e.g., suffix *ön* (the *ö* pron. like *i* in *sir*) makes a verb infinitive—thus, *lilön*, to hear, from *lil*, hear. The personal pronouns are: *ob*, I; *ol*, thou; *om*, he; *of*, she; *os*, it; *on*, one; *obs*, we; *ols*, you; *oms*, *ofs*, they. Adding a personal pronoun, instead of the infinitive suffix *ön*, gives the present indicative of an active verb—e.g., *lilob*, I hear; *pükom*, he speaks. Substantives have four cases: the nominative—e.g., *fat lilom*, the father hears; the genitive or possessive, formed by adding *a* to the nominative—e.g., *buk fata*, the father's book; the dative, by adding *e* to the nominative—e.g., *fate*, to the father; the accusative or objective, by adding *i* to the nominative—e.g., *löfobfati*, I love the father. The plural adds *s* to the singular—e.g., *fats*, fathers. There is no article. All nouns are masculine except those which by nature are feminine. A few, abstract, are neuter, ending in *os*—e.g., *jönikos*, the beautiful. Adjectives add *ik* to a root—e.g., *pöf*, poverty. *pöfik*, poor: the comparative adds *um*—e.g., *pöfikum*, poorer; the superlative, *ün*—e.g., *pöfikün*, poor-

VOLAR—VOLATILE

est. The adjective is placed after the noun, except, if there be two, the more important before the noun. *Ka* means than. *So* and *as* are used as in Eng. *No* negatives a verb—e.g., *no pükof*, she speaks not. *Li*'s the interrogatory suffix—e.g., *pükof-li?* does she speak? Verbs have six tenses: the present adds the personal pronoun—as, *logob*, I see; the imperfect prefixes *ä*—as, *älogob*, I saw; the perfect prefixes *e*—as, *elogob*, I have seen; the pluperfect prefixes *i*—as, *ilogob*, I had seen; the first future prefixes *o*—as, *ologob*, I shall see; the second future prefixes *u*—as, *ulogob*, I shall have seen. The passive verb takes *pa*—as, *palöfob*, I am loved; but only *p* in other tenses. The subjunctive mood takes *la*—as, *logob-la*, if I see. The conditional takes *öv*—as, *äloröbör*, I should see. The imperative adds *öd*—*logoböd*, see. There is a durative mood, inserting *ai*—as, *löfön*, to love; *ailöfön*, to love steadily. The participle add *öl*; and the various tenses of the participle prefix certain vowels. *Ne* negatives—as, *läbik*, happy; *neläbik*, unhappy. *Ge* means back—as *gepükön*, to speak back or answer. For the various classes of pronouns, adjectives, adverbs, the prepositions, conjunctions, etc., with vocabulary and pronunciation, the reader is referred to manuals, like Huebsch's, Sprague's and others. The above gives a general notion of the language. The first congress of Volapükians, of 300 members, was held in Switzerland 1886; a second at Munich 1887; an international one at Paris 1889. There are numerous societies to promote the language in Europe; some in the United States. It has been taught in the College of the City of New York. It is claimed that one may learn the grammar in ten days, and to speak the language in four or five weeks. It remains to be seen whether a newly invented language can be made universal, and whether the grotesqueness of Volapük is likely to be an element of success. Its name and many of its words are ludicrous to an English ear, and especially to an American sense of humor. One would regret that, while Herr Schleyer was about it, he did not invent a musical language, instead of one extremely cacophonous.

VOLAR, a. *völ'ér* [L. *vola*, the palm of the hand]: in *anat.*, of or belonging to the palm of the hand, as the *volar* artery.

VOLATILE, a. *völ'ä-tíl* or *-tíl* [F. *volatil*—from L. *volatilis*, flying—from *volārē*, to fly: It. *volatile*]: capable of passing easily into the aeriform state, as hartshorn, musk, etc.; lively; full of spirit; airy; changeable of mind; fickle; in *OE.*, able to fly through the air; volant. **VOL'ATILENESS**, n. *-nēs*, or **VOL'ATILITY**, n. *-tíl'ī-tī*, the property of being quickly dissipated or of passing off into an aeriform state; liveliness; fickleness; instability. **VOL'ATILIZE**, v. *-īz*, to cause to exhale or evaporate; to pass off in fumes or vapor. **VOL'ATILIZING**, imp. **VOL'ATILIZED**, pp. *-īzd*. **VOL'ATILIZABLE**, *-ī-zā-bl*, that may be quickly dissipated. **VOL'ATILIZA'TION**, n. *-tíl'ī-zā'shūn*, the act or process of causing to pass away in the aeriform state.—**SYN.** of 'volatility': levity; giddiness; lightness; flightiness; mutability; airiness.

VOLAUVENT—VOLCANO.

VOLAUVENT, n. *vol-ō-vâng'* [F., a puff of wind]: in *cook.*, a raised pie made with a crust of very light and rich puff-paste; an enlarged and highly ornamented patty.

VOLCANO, n. *vōl-kā'nō*, plu. **VOLCA'NOES**, *-nōz* [It. *volcano*; F. *volcan*, a volcano—from *Vulcānus*, in *anc. L. myth.*, the god of fire]: an opening in the earth's crust from which various kinds of matter in a highly heated condition are ejected, such as gases, steam, ashes and cinders, masses of solid rock, and molten rock called lava. The heavier portions of the materials thus ejected fall back within and around the vent, thus in time building up the hilly or mountainous cones by which a V. is in general distinguished. The depression in the top of these conical formations is called the crater; and the appearance of burning and of vomiting forth flame and smoke, peculiar to a V. in action, is not caused by external combustion, but is simply the fiery reflection thrown on the ascending volumes of steam and vapor from the incandescent materials within the vent. **VOLCANIC**, a. *vōl-kān'ik*, pert. to or produced by a volcano. **VOLCANICITY**, n. *vōl'kā-nīs'ī-tī*, state of being volcanic; also **VOL'CANISM**, n. *-kān-izm*. **VOLCA'NIAN**, a. *-nī-ān*, a poetical form of *volcanic*. **VOL'CANITE**, n. *-kān-īt*, Augite (q.v.). **VOLCANIC BOMBS**, spherical masses of lava frequently thrown out in great numbers and of all sizes by active volcanoes. **VOLCANIC CONES**, volcanic hills of active or of recent eruption. **VOLCANIC FOCI**, *fō'sī*, subterraneous centres of igneous action. **VOLCANIC MUD**, fetid sulphureous mud discharged by volcanoes.—*Volcanoes* are not confined to the dry land. In 1796 a column of vapor was seen to rise from the Pacific Ocean about 30 m. n. of Unalaska. The ejected materials having raised the crater above the level of the water, the fiery crest of the islet illuminated the region 10 m. around. Six years afterward, when a few hunters landed on the new island, they found the soil in some places so hot that they could not walk on it. Repeated eruptions have increased the dimensions of the island, until now it is several thousand ft. high and between two and three m. in circumference. In the same region is the volcanic island Kliutschewsk, which towers out of the sea to the height of 15,000 ft.

The lava, scorïæ, and ashes thrust out of the crater or vent of a V. form highly inclined and more or less regular beds on the surface of the mountain, extending from the crater-mouth to varying distances down the sides of the V. This method of increase gives the uniform conical outline to volcanoes, without the terraces or breaks common in other mountains. The sides are often furrowed longitudinally by straight narrow ravines, which increase in number toward the base. These are produced by the action of running water obtained from rain or from melting snows during an eruption. The rapidity with which floods rush down the steep sides of a V. gives prodigious force, which the loose scorïæ and ashes, and even the solid lava, cannot resist.

The grayish color of volcanic mountains is produced by the ash and scorïæ, which, though in composition the same

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as the dark lava, have this lighter color from the minute subdivision of their particles. When a particular series of rocks remain on the surface, and are not covered by the products of more recent eruptions, they weather and decompose, and produce a very fertile soil speedily clothed with vegetation: thus the whole aspect of the formerly bare and uniformly colored mountain is changed.

The vent or crater is a more or less circular opening, communicating with the source whence the ejected materials are obtained. The crater has generally one side much lower than the other—that from which the prevailing wind blows, which carries with it the showers of ashes to the opposite side of the mountain. In many cases the cone is truncated; a wide hollow of immense extent, and often of great depth, in whose base the crater is situated, occupies the summit. The Spanish name *Caldera* is technically applied to these hollows. Their origin has been a subject of controversy. Von Buch and others maintained that they are craters of elevation—i.e., that the rocks were originally spread out in nearly horizontal deposits, and then upheaved into a dome shaped mountain, with the hollow caldera in the centre of its summit. The more satisfactory explanation is that the original cone, formed by the alternate deposition of the lava and ashes ejected from the crater, has—from the great heat of the molten lava rising in the tube of the V., or from gaseous explosions—given way and fallen in. The cones of both Etna and Vesuvius have frequently fallen in and been reproduced. In 1822 the summit of Vesuvius was reduced by 800 ft. The immense size of some calderas seems, however, opposed to this theory. That of the island of Palma, one of the Canaries, is three to four geographical miles in diameter, and the precipices which surround the cavity are 1,500 to 2,000 ft. in vertical height. They form an unbroken wall, except at the s.w. end, where a deep gorge permits the passage of the torrent which drains the caldera. The precipices are traversed by numerous vertical dikes, and exhibit all the appearances which would be produced by the falling in of the huge summit of this once enormous volcano.

The pressure of the incandescent lava often forces for itself a passage to the surface before it reaches the mouth of the crater, and this is more frequently the case when the volcanic eruption is accompanied with earthquakes. Immense vertical fissures are found radiating from the centre of the volcanic action, and reaching the surface of the ground, and even rising to the summit of the mountain; these being filled with the molten rock, which in course of time solidifies and forms often a large portion of the mountain mass, as is shown in the Val del Bové on Etna (q.v.). The lava sometimes pours out of these fissures instead of rising to the crater. During a terrible eruption of Hecla, 1783, a prodigious stream of lava flowed from a lateral crevice; moving slowly down the mountain-side, it reached a distance of 50 m. in 42 days; it then branched into two main streams, one running 40 m., the other 50 m. further toward the sea. Its depth varied from 600 to 1,000 ft., and

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its greatest width was 15 m. The amount of lava poured out into this stream would almost equal Mont Blanc in bulk.

When the eruptive power of a V. exhausts itself, it still frequently shows itself by changes which it produces in the level of the country around. In the latter part of the 18th c., a volcano appeared in the centre of the great table-land of Mexico, and raised an area of nearly 4 sq. m. 550 ft. higher than it was before, covering it at the same time with conical hills of various heights, the highest of which is Jorulla, 1,600 ft. But sometimes a subsidence takes place. In 1772 the upper 4,000 ft. of the volcano of the Papan-dayang, a mountain in Java, 9,000 ft. high, was blown into the air, and, with a vast amount of ashes, overwhelmed 40 villages. A still more powerful explosion occurred in the island Sumbowa, e. of Java, 1822; it was heard a thousand miles, and 12,000 of the islanders were destroyed.

A volcanic eruption is generally preceded by rumbling noises and slight movements in the earth; then fitful puffs of gases and steam are given off. These contain much sulphur; and some volcanoes give out such quantities of carbonic acid and other mephitic gases as to destroy the animals in the neighborhood: see UPAS-TREE. The eruption itself begins, perhaps, with ejection of the finest dust, and that with such force as to project it high into the atmosphere, where, taken up by air-currents, it is often carried to enormous distances. In 1845 the dust from Hecla was after ten hours lying thick on Orkneys and Shetlands. Ashes from Consequina fell, 1835, in Jamaica, 700 m. off; and fine dust covered the ground 30 m. s. of the volcano to a depth of 10 ft. During or after the stupendous eruption, 1883, May 23, of the volcano on the island of Krakatoa, in the Straits of Sunda, between Sumatra and Java, dust and mud were thickly deposited over an enormous area. Nearly the whole island was blown away, and the resulting tidal waves, 50-60 ft. high, swept to death 30,000 people on the shores of neighboring islands, and rolled on, diminishing in height, to the n. Atlantic and around most of the border of the Pacific. The waves of air twice encircled the globe. It has been estimated that 12 cubic m. of material were hurled forth in this great convulsion, most of it falling in the vicinity. Remarkable solar phenomena in Ceylon, s. Africa, Brazil, and elsewhere, were attributed to the presence in the upper atmosphere of volcanic dust from this source; and in the United States, as well as in Europe, gloriously colored skies before sunrise and after sunset, months after the eruption, were regarded as due to the same cause. Sediment left on windows after rain and on snow was chemically tested, and found unmistakably to contain volcanic dust.

Sir William Hamilton says that, 1779, the jets of liquid lava from Vesuvius, mixed with scorix and stones, were thrown to a height of 10,000 ft., giving the appearance of a column of fire. The lava, however, generally issues from openings in the side of the mountain. It pours forth in a perfectly liquid state, bright and glowing with the splendor of the sun. At first it flows rapidly; but as its surface be-

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comes cooled and converted into slag, its velocity diminishes. It has to burst the indurated coating before it can continue its progress, and the liberated lava when it flows bears on its surface masses of scorïæ, looking like the slag from an iron furnace.

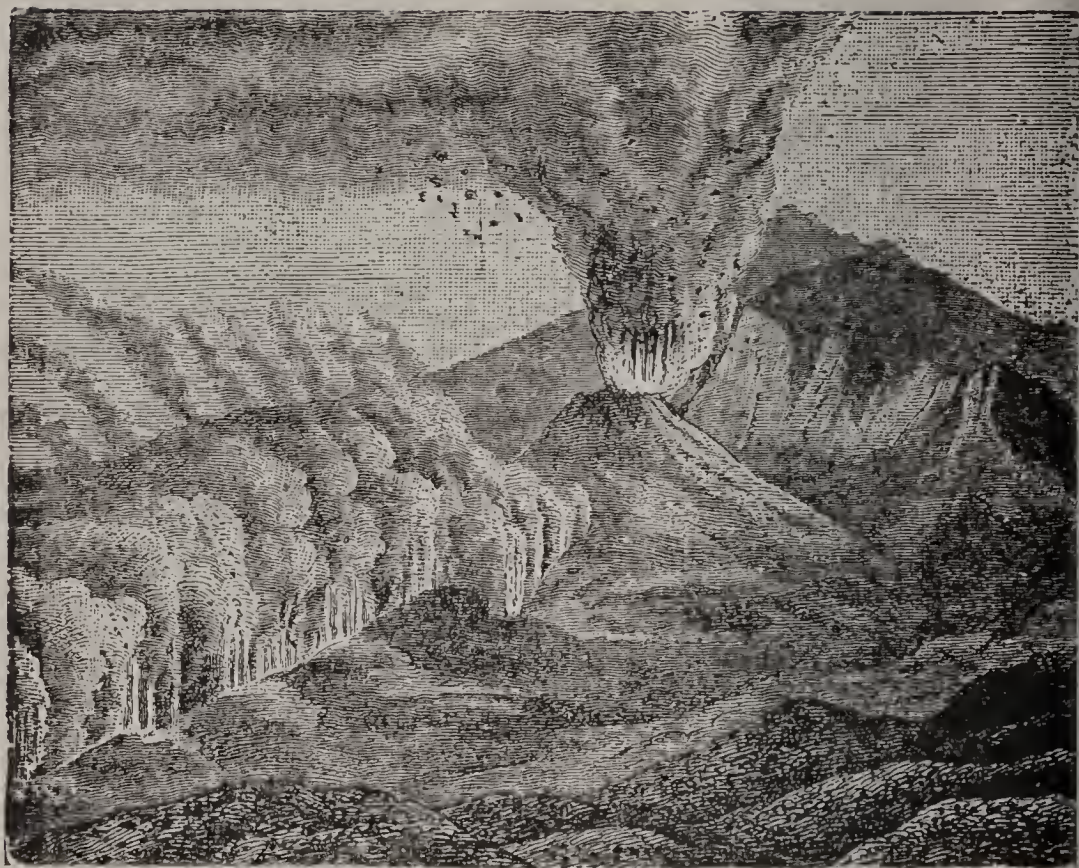
The theories propounded to account for volcanic action are either chemical or geological. Sir H. Davy suggested that if immense quantities of the metallic bases of the earths and alkalis were present in the interior of the earth, all the phenomena would be produced by their oxidization from contact with air or water. Although the distinguished author of this theory abandoned it, it has since been taken up and advocated by Daubeny and others. Bischof, assuming that the interior of the earth consists of a highly heated and fused mass, considers that the mechanical action of water, converted into steam by the great heat, would produce volcanic action. Both theorists seek support for their views from the fact that the great majority of volcanoes are on or near the sea-coast. Geologists accepting also the doctrine of internal heat, and believing that at a certain depth the rocks of the earth are; partially at least, in a state of fusion, explain volcanoes by considering them as connections established between the interior of the earth and the atmosphere, the elastic force of steam being the propelling power. Darwin, from observations in all parts of the world, believed that volcanoes are found chiefly, and, indeed, almost only, in those areas where subterranean motive-power has lately forced or is now forcing upward the crust of the earth, and are invariably absent in those where the surface has lately subsided or is still subsiding. Opinion now tends to the theory that (without reference to elevation or subsidence) increasing layers of sediment blanket the previous ones beneath, so as to retain the earth's heat; and when by this process the heat is high enough to convert into steam the water that always saturates sediments, the steam makes its way laterally to any fissure or point of least resistance, there locating a volcano, or, in other cases, hot springs, fumaroles, or mud-volcanoes. But even this view leaves the absence of volcanoes, or active ones, along great lengths of coast, an unsolved problem, though it well explains those that are present, and the quiescence of old volcanoes left distant from coasts by continental elevation. A fact of some account is that the subsided sea-areas hinge on the stable continents, and hence lines of fissure are along coasts; also that the earth's shrinkage, together with sea-subsidence, brings a lateral pressure and rupture on the sea-borders. The mineral and chemical constituents of the various materials ejected by volcanoes have been carefully studied, and much valuable information on this and the kindred subject of the causes of volcanic action is in Judd's work, *Volcanoes: What They Are, and What They Teach* (1881). See also Shaler's *Aspects of the Earth* (1889); and Reclus's *The Earth*.

Volcanic action is limited to particular regions of the earth. In these regions the active vents are distributed at intervals, and generally in a linear direction. The Pacific

Ocean is bounded by an almost unbroken line of active volcanoes. Beginning in the New South Shetlands, where there is an active volcano lat. $62^{\circ} 55'$ s., we pass to 'Tierra del Fuego, and then on to the Andes, which are throughout their whole course volcanic, though the great centres of present action are confined to Chili, Peru, the neighborhood of Quito, Guatemala, and Mexico. The line is continued northward by the burning mountains of n.w. America, and the Aleutian Islands carry the chain across to Kamtchatka on the Asiatic side. Here turning southward, the line may be traced through the Kurile Islands, Japan, Formosa, the Philippines, Moluccas, New Guinea, and the Solomon and New Hebrides groups, to New Zealand. From Celebes a branch proceeds n.w. through Java and Sumatra to Barren Island in the Bay of Bengal; and even beyond this we find a region in n. India subject to earthquakes, which may lead us, on the one hand, to the volcanic region in Tartary, or, on the other, through Asia Minor to the Greek Archipelago, Sicily, Naples, and on to the Canaries and Cape de Verdes. According to the geological theory, the lines thus traced would represent rising lands, where the crust is less strong, and so less liable to repress the expansive powers below. There are also a number of isolated volcanoes scattered over the surface of the earth; these are supposed to have opened a star-shaped communication with the interior: the most remarkable are Jan Mayen, lat. $70^{\circ} 49'$ n.; and those in Iceland in the n., and Mount Erebus in South Polarland, lat. $77^{\circ} 32'$ s.

VOLE, n. *vøl* [F. *vole*—from *voler*, to fly]: a deal at cards that draws all the tricks: V. to win by a vole.

VOLE, n. *vøl* [said to be connected with *wold*, a plain]: rodent quadruped of the genus *Arvicola*, belonging to a group which some naturalists constitute into a family (*Arvicolidae*), but which is more generally regarded as a tribe or sub-family of *Muridae* (q.v.). This group is characterized by thicker and shorter form than that of the true rats and mice; obtuse muzzle; ears of moderate size; round and hairy tail, not so long as the body; molar teeth with flat crowns, which present angular enamelled plates, and without roots, or else very short roots of alternating triangular prisms, instead of fangs. The Lemmings (q.v.) belong to this group. The species are numerous and widely distributed, being found in Europe, Asia, Africa, and N. and S. America. Some are completely terrestrial in their habits, and are known as 'field-mice;' others are aquatic, and are known as 'water-rats.' In this genus the teeth are only 10 in number, 2 incisors and 3 molars in each jaw. One of the most common European species is the Field V. (*A. agrestis*), known also as the Meadow Mouse and Short-tailed Field-mouse. The whole length of the head and body is scarcely more than 4 in., that of the tail rather more than an inch and a quarter. Excessive numbers of this little animal were regarded in 1813,4 as threatening the destruction of the Forest of Dean, and the New Forest in Hampshire, England; and many trees were killed; but a remedy was found in digging pits, into which the voles fell,



Eruption of One of the Small Craters of Ætna.



Interior of Crater of Vesuvius, 1880.

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and from which they could not escape. The same method has been successfully employed in some forests of continental Europe. This species of *V.* is found in most parts of Europe and in many parts of Asia. It is common in the Himalaya.—Another very common species is the Water-*V.* (*A. amphibia*), popularly known as the Water-rat, a much larger animal, the head and body being about $8\frac{1}{4}$ in. long, and the tail $4\frac{3}{4}$ in. It burrows in the banks of streams, ditches, and ponds. Its food appears to consist chiefly of aquatic plants, though it refuses no kind of vegetable food, and has been known to store potatoes in its burrow for winter. This species is widely diffused over the continent of Europe. There is a black variety of it, common in parts of England and Scotland, which has been described as a distinct species (*A. atra*).

The great number of American species of field-mice have been distributed under various genera, *Arvicola* retaining only those (among others with broad incisors, rootless molars with flat crown and serrate margin, body heavy, eyes small, snout blunt, and slow motion due to short legs) which have ears concealed, and some other features. It includes the Pine Mouse (*A. pinetorum*), of N. Y. to Ill. and s., of chestnut color, length $4\frac{3}{4}$ in.; the Meadow Mouse (*A. Pennsylvanicus*), of the U. S. generally, grayish brown, darker on the middle of the back, and hoary below, length $5\frac{1}{2}$ in.; and *A. austerus*, of Mich. to Dak. and La., grizzly brown, and lead color below, length the same. The Long-eared, the White-footed, the Red, the Rice-field, the Harvest, and other species, separated under other genera, are with the above placed under the one family *Muridæ* (q.v.).

VOLGA, *võl'gâ*: chief river of Russia, and the longest in Europe; rising in a marshy plain among the Valдай Hills, in the govt. of Tver; lat. 57° n., long. $33^{\circ} 10'$ e. From its source, 550 ft. above sea-level, and 633 ft. above the level of the Caspian Sea, into which it falls, the river flows s.e. to Zubzov, then n.e. past Tver and Koliazin to Mologa, where it turns e.s.e., and flows past Jaroslav, Kostroma, Nijni-Novgorod, and Kazan, 50 m. below which, on receiving the Kama, it turns s., passing Simbirsk, Stavropol, and Samara. Thence it flows s.w. to Tzaritzin, where it bends to the s.e., and enters the Caspian Sea by many mouths, after a course of 2,325 m. The V. waters 9 govts.—Tver, Jaroslav, Kostroma, Nijni-Novgorod, Kazan, Simbirsk, Saratov, Samara, and Astrakhan—and 12 other govts. are watered by its tributaries; total drainage area 563,300 sq. m. The course of the V. is generally divided into three parts—the upper part reaching from its source to its confluence with the Szeksna, and, though presenting many hindrances to navigation, yet capable of being traversed from Tver to Rybinsk by craft of $1\frac{1}{2}$ and 2 ft. draught; the middle part, from Rybinsk, in Jaroslav, to Nijni-Novgorod, navigable for larger craft; and the lower V., from Nijni-Novgorod to Astrakhan—where it is about 90 ft. deep—navigable for the largest vessels. Below Astrakhan the V. becomes very much shallower—in some places

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only 1½ ft. deep. At Tver the width of the river is 720 ft.; at Mologa, 2,060 ft.; at Nijni-Novgorod, 2,069 ft., but sometimes in the spring 2½ m. wide; at Simbirsk, about a mile wide; between Samara and Sysran, 1 to 3 m. wide. Below Tzaritzin, at the confluence of the Sarpa, the river affords few facilities for navigation, and is remarkable for the number of branches into which it divides before entering the Caspian Sea. The banks of the V., which are elevated in the upper and middle reaches, become much lower as the river approaches its embouchure. The chief ferries and commercial towns on the V. are: Rjev, Zubzov, Tver Koliazin, Uglitch, Mologa, Rybinsk (great centre of the grain-trade), Jaroslav, Kostroma, Nijni-Novgorod, Kazan, Simbirsk, Samara, Tzaritzin, and Astrakhan. The system of water-communication established by the V. and its tributaries is of the greatest importance to the commerce of Russia, connecting, as it does, the central districts of the country with the White Sea by the canal of the Prince of Würtemberg; with the Baltic by the three canal systems of Tichvin, Vishni-Volotchok, and Mariinsk; with the Black Sea by the Upa canal, which connects the Oka and the Don; with the Caspian Sea by the great stream of the V. itself; and with Siberia by the rivers Kama and Tchus-sovaia. The principal affluents on the right are the Oka (q.v.) and the Sura; on the left, the Tvertza, Mologa, Szeksna, and Kama (q.v.). It has been estimated that the total annual value of the goods carried on the V. and its tributaries (100 of which have an aggregate navigable length of 14,600 m.) cannot be less than 500 million rubles (\$375,000,000), exclusive of the value of 34 million tons of timber and fuel, though official returns make these amounts much less. The V. and its tributaries are frozen over for several winter months, when traffic is carried on by sledges. The fisheries of the V. are extensive and valuable: the fish chiefly taken are the sturgeon, roach, pike, bream, tench, gudgeon, lamprey, etc., and the Caspian herring.

VOLHYNIA, *vól-hín'î-a*: government of w. Russia; bounded s.w. by Galicia, w. by Poland from which it is separated by the river Bug; 27,731 sq.m. The surface in the north is low, and plains and morasses, covered with forests, abound; in the south, are hills, branches of the Carpathian Mts., not higher than 1,200 ft. Almost all the rivers flow n., and join the Pripet, affluent of the Dnieper; a few streams, however, flow w., and join the Bug, on which river timber is floated down to Prussia. The soil is sandy or clayey; agriculture flourishes in the south, and grain is exported to Odessa, Galicia, Poland, and partly to Great Russia. Cattle-breeding has always been prosperous in V. until recently, but a fine breed of sheep are still reared, and this govt. possesses the finest studs in the empire—those of the Princes Sangousko and Tzartorisky. Of the woods, the principal riches of the n. districts, fir is chief. The forests abound in foxes, hares, and bears, and hunting is a favorite pastime. Many sugar-mills, cloth-factories, and distilleries are in operation, and the manufactures are increasing yearly. Grain, cattle, sheep, wool,

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cloth, linen, timber, honey, and wax are principal articles of trade.

V. in early times belonged to the anc. Russians, but was conquered by the Lithuanians and Poles 1320, and remained in their hands till its annexation to Russia 1798.—Pop. (1897) 2,997,902, of whom nearly four-fifths were Little Russians, and about one-eighth were Jews.

VOLITION, n. *vō-līsh'ūn* [F. *volition*—from L. *volo*, I will: It. *volizione*]: the act of willing; the act of determining choice or forming a purpose; the power of willing or exerting choice (see **WILL**). **VOLITIONAL**, a. *-ūn-āl*, of or pertaining to volition. **VOLITIVE**, a. *vōl'ī-tīv*, able to will, as the *volitive* faculty; of or pertaining to the will.—**SYN.** of 'volition': will; purpose; determination.

VOLLEY, n. *vōl'lē*, **VOL'LEYS**, n. plu. *-lēz* [F. *volée*, a flight; *voler*, to fly—from L. *volāre*, to fly]: an outburst of many things at the same time; a discharge of many small-arms at once—with cannon such a discharge would be called a *Salvo* (q.v.); an outburst, as of abusive language: V. to discharge many things at one time; to throw out. **VOL'LEYING**, imp. **VOL'LEYED**, pp. *-lēd*: **ADJ.** discharged with a sudden burst.

VOLNEY, *vōl'ně*, F. *vol-ně'*, **CONSTANTIN FRANÇOIS CHASSEBŒUF**, Comte DE: political theorist, and social and economic reformer: 1757, Feb. 3—1820, Apr. 25; b. at Craon, in Anjou, France; son of an advocate. His surname V. was assumed on his arriving at manhood, according to the curious custom in his country at that time. He studied at the colleges of Ancenis and Angers, and at the Univ. of Paris. His later studies were first in law and then in medicine; but he never practiced. Having inherited a competency from his mother, he set forth 1783 for travel in Egypt and Syria. Returning 1787, he published his famous *Travels in Syria and Egypt*, a trustworthy, lively, and interesting account of the tribes which he had visited. This work gave him great reputation. The sagacity of some of his political conclusions—the result of his residence among these peoples (pub. 1788 in a pamphlet, *Considerations on the War between the Turks and the Russians*)—has been shown by subsequent events. In 1790 he was elected to the *états généraux*, as a member for his native district; and in the political discussions of the years which followed, showed himself, as in his writings, an advocate of popular liberty, and an acute and brilliant though prejudiced mocker at all systems of religion. His wise and forcible opposition to popular excesses led to his imprisonment 1793, from which he was not liberated till after the downfall of Robespierre, 1794, July.

In 1794, Sep., V. published his *Ruins; Reflections upon the Revolutions of Empires*, on which, and on his *Travels*, his reputation chiefly rests. The discussions in the *Ruins* cover many radical questions in politics, dealing with them on the French principles of 1789. His able and worthy advocacy of toleration in matters of opinion is needlessly burdened with sarcastic declaration of the human origia

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and the essential falsity of all religious systems. In his *Physical Principles of Morality*, he treats morality as a merely physical and material science, having no object but the conservation and improvement of society. After a series of brilliant and paradoxical lectures as prof. of history for a few months in the École Normale, he went to the United States 1795, intending to make his residence there; but circumstances made his stay there extremely disagreeable to him, and he returned to France in the spring of 1798. He had been elected a member of the Institute, and soon after his return he was admitted to the Acad.; and thenceforth his life was prosperous and untroubled. Bonaparte, on becoming first consul, sought to make V. a member of his government as consul or as minister of the interior: these offices he refused, but accepted a seat in the senate. V. protested against the establishment of the empire, and resigned from the senate; but his resignation was declined. Afterward his occupations were mostly literary. He published *Researches into Ancient History*; and with other books, several linguistic works, in which he set forth a universal alphabet, to simplify the study of the eastern languages. He had accepted from Napoleon the title Count; and at Napoleon's downfall he was among those who were called to the house of peers by Louis XVIII.

VOLOGDA, *vō-lōg'dā*: government of Great Russia; bounded e. by the Ural Mountains, n.w. by the govt. of Archangel; extending 800 m. n.e. from Novgorod to the Ural Mts.; 155,500 sq. m. It is divided into 10 districts. Those adjoining the Ural Mts., are traversed by branches of that chain, 3,000 to 4,000 ft. high—one summit 5,540 ft. But by far the greater part of the govt. is occupied by marshy plains, covered with impenetrable forests. The soil is not fertile, except in the s.w. districts, which are the most densely peopled, and produce grain sufficient for local consumption and the supply of the distilleries. In the middle districts there are comparatively few inhabitants; and hemp is the only crop largely produced. The wooded morasses of the north are inhabited only by Finnish tribes engaged in hunting: usually the river-banks are the only inhabited places. The principal rivers, 15 of which are navigable, are the N. Dwina, with its great upper waters, the Suchona, Jug, and Withegda; and the Petchora, with its affluents. Lakes are numerous. Salt-works, iron-works, and distilleries are in operation; and salt, iron, skins, tallow-candles, and cheese are exported, and grain and manufactured goods imported. Pop. (1897) 1,365,587.

VOLOG'DA: city of Great Russia, in the s.w. angle of the govt. of V., of which it is the cap.; on both banks of the river V.; 467 m. e. of St. Petersburg. It is said to have been founded in the 13th c. by settlers from Novgorod, to which principality it belonged till the 15th. c., when it was annexed to Moscow. In 1553, when England opened a trade with Russia, through the port of Archangel, V. was the great entrepôt for goods deported n. by the N. Dwina; and it still exports to St. Petersburg and Arch-

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angel products of its own and neighboring govts. to a considerable amount. Nigello and filigree work are manufactured. Pop. (1897) 27,822.

VOLSCI, *vŏl'si*: ancient Italian people, closely related to the Umbrians: see **UMBRIA**. Their territory was bounded w. by that of the Latini, n. by that of the Æqui and Hernici, e. by that of the Samnites, s. by the sea. Along nearly their whole coast lay the Pontine Marshes; inland their territory was somewhat mountainous. The V. were a brave and warlike people, who, frequently in alliance with the Æqui, were incessantly at war with the Romans for more than 200 years previous to B.C. 338, about which time it appears that they were finally subdued, their territory incorporated into Latium, and they themselves created Roman citizens: see **LATINI**. These wars were very harassing to the Romans, as they were often carried on not so much by the V. as a whole, as by different cities, each frequently on its own account. Some of the chief towns, and those prominent in the war were Antium, Velitræ, Satricum, Privernum, Ulubræ, Suessa Pometia, Anxur, and Tarracina; and later, Forum Appii and Tres Tabernæ. The legend of Coriolanus (q.v.) is connected with the Volscian wars. See **ROME: TARQUINIUS SUPERBUS: ANTIUM**. After their subjugation their history belongs to that of Rome-(q.v.).

VOLSK, or **VOLJSK**, *vŏlsk*: town of European Russia, govt. of Saratov; on the right bank of the Volga; 90 m. n.e. of Saratov. Fat and skins are prepared and exported to St. Petersburg, and grain is largely exported to Astrakhan and Rybinsk. Gardens and orchards are a chief feature of V. and its vicinity; and the fruits are exported principally to Niji-Novgorod. Pop. (1897) 27,039.

VOLT, n. *vŏlt* [F. *volte*; It. *volta*, a turn—from L. *volūtus*, pp. of *volvĕrĕ*, to turn]: a sudden movement or leap in fencing to avoid a thrust; a gait of two treads, made by a horse going sideways round a centre.

VOLT: see **UNITS, SCIENTIFIC**.

VOLTA, *vol'tā*, **ALESSANDRO**, Count: renowned Italian physicist: 1745, Feb. 18—1827, Mar. 5; b. Como; of noble family. He received an excellent education. In 1779 he was appointed prof. of nat. philos. at Pavia. In 1815 the emperor of Austria made him director of the philosophical faculty at Padua, whence 1819 he retired to his native town.—V., while a youth, had shown a taste for letters, and had written two poems, one in Italian, the other in Latin; but as he grew older, he applied himself exclusively to the sciences, especially those connected with electricity. At intervals 1777–82 he visited Switzerland, Tuscany, Germany, Holland, France, and England, making the acquaintance of eminent philosophers; and on his return is said to have introduced the culture of the potato into Lombardy. In 1796 he was one of a deputation sent to solicit the forbearance of Napoleon; and was received with distinction by the French general, who afterward invited him to exhibit to the members of the Institute in Paris the

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action of the 'pile' (see VOLTAIC PILE) which he had invented, enrolled him in the Legion of Honor, and conferred on him the order of the Iron Crown, with the titles Count and Senator of the Kingdom of Italy. He was also elected (1801) a foreign associate of the French Institute, ten years after he had been made a fellow of the Royal Soc. of London.—V.'s contributions to the science of electricity are of great importance, the chief being his theory, in opposition to the 'animal-electricity' doctrine of Galvani, that the electric power resides in the metals; though, in turn, he fell into the error of supposing that the chemical action of the different kinds of metal on one another was only incidental. He also invented an electric battery, consisting of a series of cups arranged in a circle, each cup containing a saline solution, in which were immersed, edgewise, two plates, one of zinc, the other of silver, the zinc plate in one cup being connected with the silver one in the next by means of a wire: this battery was soon superseded by his 'pile.' He invented 1775 the *Electrophorus* (q.v.); in 1782 the electrical *Condenser* (q.v.), employing with it an electrometer (see ELECTRICITY), in which two straws were used instead of the gold-leaf strips now in use; also (1777) the hydrogen-lamp and the electrical pistol. Most of his important discoveries were communicated by him directly to the Royal Soc. (pub. in *Philosophical Transactions*, 1782, 3, 1800). A collection of V.'s works, 5 vols., was pub. 1816 at Florence. After him Galvanism (q.v.) is often called *Voltaic Electricity*; and the practical unit of electro motive force is called a *volt*.

VOLTAIC, a. *vŏl-tă'ik* [after *Volta*, Italian physicist]: pertaining to Alessandro Volta (q.v.), or to voltaism. **VOLTAISM**, n. *vŏl'tă-izm*, galvanism or electricity improved and modified by Volta. **VOLT**, n. *vŏlt*, the unit of electro-motive force: see OHM: UNITS, SCIENTIFIC. **VOLTAIC BATTERY**, an apparatus consisting of a series of pairs of plates of different metals, as zinc and copper, immersed in a fluid, usually diluted sulphuric acid, and connected by wires for the development of Electricity (q.v.). **VOLTAIC ELECTRICITY**, the phenomena resulting from the evolution of a current of electricity by chemical action. **VOLTA-ELECTRIC**, a. of or pertaining to voltaic electricity. **VOLTAMETER**, n. *vŏl-tă-m'ĕ-tēr* [Gr. *metron*, a measure]: an instrument for measuring the force or intensity of a voltaic current by its effects in decomposing water, or by its heating effects; also called VOLTA-ELECTROMETER. **VOLTA-TYPE**, n. *vŏl'tă-tip*, another name for *electrotype*. **VOLTA'S** or **VOLTAIC PILE**, a galvanic apparatus consisting of a series of double plates of zinc and copper with a wet cloth between each pair, a copper wire being attached to the zinc plate at the bottom and the copper plate at the top.

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VOLTAIRE, *vol-tär'*, FRANÇOIS-MARIE AROUET DE (real name AROUET): one of the most famous of French writers: 1694, Nov. 21—1778, May 30; b. Paris; son of a notary; of Poitevin extraction. [V.'s own account, late in life, gives a different date (in the same year) for his birth, and a different place: the statement above is from the official register of his baptism.] He was educated at the College of Louis le Grand in Paris; and was then set to study law by his father. But this pursuit he speedily quitted for the career of a man of letters. By his godfather, the Abbé de Châteauneuf, he was introduced to the celebrated Ninon de l'Enclos, and through her to the highest French society. In these wicked and witty circles, being himself deficient in neither wickedness nor wit, the young man prospered extremely. His father, however, deeply disapproving of the life he led as immoral, and probably expensive, had him sent to Holland with an embassy. Here he became involved in a love-affair of the more respectable kind, which ended, not in marriage, as he seems to have proposed, but in his being sent back to Paris, to resume his gay career. About this time (1715) he was introduced to the famous 'court of Sceaux,' the distinguished coterie of the beautiful Duchesse du Maine. Shortly, his brilliant course suffered another interruption: on suspicion (unfounded) of his being author of some satirical verses reflecting on the government of Louis XIV., then just dead, he was sent to the Bastille 1717, May 17, where he remained 11 months. This period he improved by sketching his famous poem afterward published as the *Henriade*, and by finishing his tragedy *Œdipe*, produced 1718, Nov. 18, with great success. The same success did not attend his next ventures: his tragedy *Artemire*, 1720, was hissed off the stage; and his *Mariamne*, 1724, fared little better. Meantime he had again visited Holland, making, on the way, the acquaintance of Jean Baptiste Rousseau, a poet of some importance, then living at Brussels. The two geniuses met as friends, only to part as irreconcilable enemies. Their quarrel is said to have originated in a characteristic *mot* of V., who, his critical opinion being asked of an *Ode à la Postérité*, which Rousseau read to him, had the candor to reply thus: 'Mon ami, voilà une lettre qui n'arrivera jamais à son adresse.' In the summer of 1725 occurred a misadventure which for V. had important consequences. At the dinner-table of the Duke de Sulli, he resented with spirit an affront by the Chevalier de Rohan, who, worsted in the war of wit, as most men were likely to find themselves with V., avenged himself some days later by having his adversary thrashed in public by footmen. Subjected to so gross an outrage, V. retired for a time into private life, assiduously perfected himself in the small-sword exercise, and then challenged the chevalier to a meeting in the *duello*. The chevalier, having immortalized himself sufficiently by his insult to the poet, considered it unnecessary to aspire to the further immortality of being killed by him: he accepted V.'s challenge; but on the morning of the day

appointed, a *lettre de cachet* consigned V. once more to the Bastile. Thence, after a fortnight, he was released under sentence of exile; and he betook himself to England. A little time previous, the young Arouet had assumed the name of V., destined to become so famous. As to the origin of this name, considerable perplexity has existed; but Carlyle's conjecture is probable, in vol. II. of his *Frederick*, that it is simply an anagram of Arouet l. j. (*le jeune*)—the *u* being taken as *v*, and the *j* as *i*.

Arriving in England 1726, V. remained there nearly three years. Of this episode of his life we have only meagre account. It is certain, in a general way, that he had the *entrée* to the best English society; he knew Bolingbroke, Pope, and many others of the intellectually distinguished. To V. his residence in England was fruitful of new knowledge and ideas; in the school of the English deists, Bolingbroke, Collins, Tindal, Wollaston, etc., he found speculations much to his mind; the philosophies of Newton and Locke he studied diligently; and in his subsequent dramas there may be traced a distinct influence from Shakespeare, whom, however, he has expressly vilified, as a barbarous monster of a writer, intolerable to any reader with the least tincture of orthodox French *goût*. Not the less the distinction remains with V. of having been the first Frenchman to recognize in some decisive, though sneering and inadequate way, the essential superiority of the great English poet, to whom also he paid the compliment of copying him. The intellectual debt thus indicated was not the only one which V. owed to England. While resident there, he published in a revised form his epic poem the *Henriade*, a surreptitious edition of which had appeared in France. The work was dedicated in English to Queen Caroline; the subscription for it was headed by her and other members of the royal family; the rank and fashion of the country could not but follow the illustrious example set them; and for result, V. could convey into his pocket a comfortable sum (stated as £8,000), which became the basis of his future immense wealth. From the time of his return to Paris 1729, he had always on hand some money-speculation—investments in corn, in bacon, or in whatever a penny could be turned, with now and then a fat army-contract which a friend might have interest to secure for him; and so shrewd in his finance was he, that—though receiving little from his books, which, despite their immense popularity, were never a source of great profit—his income at his death is ascertained to have been about £7,000 per annum, a revenue princely for those times. Of his literary labors, from this time forward unremitting, whose result appears in about 90 volumes, no detailed account can here be attempted. His was truly a universal genius, or rather, a genius covering a universal superficial area; he wrote literally everything—histories, dramas, poems, disquisitions, literary, philosophical, and scientific; novels, mostly with some theoretical purpose, of which his famous *Candide*, or *the Optimist*, may stand as the type; his literary corre-

spondence was on an unexampled scale (3,000 large, closely printed pages in the most compact editions); and he was seldom without some fierce polemic on hand, in which his adversaries had to writhe for the amusement of the public, under the scourge of his envenomed wit.

In the gay society of Paris he became acquainted with Madame du Châtelet, who was living apart from her husband, the marquis, though still on polite terms with him. She was *assez spirituelle*; a fascinating woman of the world, and in intellectual accomplishment the bluest wonder of the period; especially she was deep in mathematics, and had mastered the mysteries of Newton's *Principia*. V., as an admirer of Newton, could not but be charmed to meet him thus surprisingly put into petticoats; nor could a woman so intellectual as Madame fail, in her turn, to appreciate the tender attentions of such a genius as M. de Voltaire. Their intimacy became extreme; and finally, in 1734—the accommodating husband of the lady behaving like a philosopher and man of fashion of that time, and continuing now and then to visit them—they went off to prosecute it undisturbed at Cirey, an old chateau in Champagne, the property of the husband. There V., with ‘the respectable Emily,’ studied and wrote for the next 15 years. The arrangement seems to have been on the whole not unhappy of its kind, notwithstanding the frequent quarrels amusingly recounted by Madame de Graigny; but toward the close it became complicated for V. by the advent of another lover, Monsieur de Saint-Lambert. It is not conjectured that this gentleman knew anything of Newton, or was such a genius as V.; but on some other ground, unexplained, he found favor with Madame du Châtelet; and after a little unpleasantness V. was able to reconcile himself to the inevitable. This curious triangular love-affair—or *square*, if we include the husband—was not, however, of long duration: in 1749 Madame du Châtelet died about four days after childbirth.

To dissipate the sense of loneliness which overpowered him in the loss of his ‘divine Emilie,’ as V. was wont, in his more lyrical moments, to call her, he betook himself to Paris, whence, in 1751, he proceeded to Berlin, on the earnest and repeated invitation of the young king of Prussia, Frederick, since known as ‘the Great.’ Between him and V. much correspondence had already passed; and they seem to have entertained for each other a sincere admiration and regard. When they came together, however, their intercourse was found not so enchanting. Into the details of the quarrel which ensued, we need not enter. V.’s nature—always that of an impish child with a genius for mischief—soon showed itself in those ways of inferential insolence and of oblique sarcasm of which he was a master, at the expense of his literary comrades; and the king in his attempts to check these processes found himself not only foiled but fooled by V.’s trickiness. To this it may be added only that the king was a poet at once profuse and execrable; and that the main function of V.—himself a poet—was to criticise and correct his verses. V.

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detested the king's verses; the king heartily detested V.'s criticism and corrections. In mutual detestation they parted—V., at his exit from the country, being subjected to indignities which could hardly be forgiven; though a reconciliation was afterward effected, and their literary correspondence was resumed under the old forms of friendliness. Meantime, V. had avenged himself in the amusing but most scandalous chronicle, *Vie Privée du Roi de Prusse*, which was found at his death among his papers, and published, as there is pretty good reason to suppose the wicked wit meant it should be. The period of this Berlin visit was 1751, July 10—1753, Mar. 26.

After some years of somewhat unsettled life, V., in 1758, established himself along with his niece, Madame Denis, at Ferney, in Switzerland, where, with little exception, the last 20 years of his life were passed. During this period some generous traits of character are recorded of him. He built a church at Ferney, and, as usual, made trouble for himself and others in doing it. More creditable is it that he rescued from extreme want a grandniece of Corneille the great dramatist, had her carefully educated under his own eye at Ferney, and made over to her the proceeds of an annotated edition of her ancestor's works, which he issued for her express benefit. His exertions in behalf of the Calas family, victims of a shameful persecution, are well known. In 1778 he was induced by his niece to revisit Paris, arriving Feb. 10. By the Parisians the poet, now in his 84th year, was received with a tumult of enthusiasm, the excitement connected with which is thought to have hastened his death, which took place a few weeks afterward. The accounts of his despair and fear at the approach of death are mere legends.

With the possible exception of Rousseau (Jean Jacques), who in his character of *vates* and enthusiast had probably a deeper influence, V. is by far the most memorable of the band of celebrated writers whose crusade against established opinions was preparing the grand crash of the French Revolution. It was mainly in the field of religious polemic that V.'s destructive energies were exerted. It is common to stigmatize him as an atheist; but he was plainly a deist, discarding the revelation of God in the Bible, and the manifestation of God in the Christ, yet holding to the elements of a natural religion; and for this last he was criticised by the more 'advanced' minds of the period, Diderot and the like, who considered belief in a God clear evidence of intellectual infirmity. The moral element in him was almost lacking, or at least is scarcely traceable: his whole development was intellectual. He was not lacking in generosity to his dependents; but his general attitude was that of a cynic and a mocker. His intellect, marvellously brilliant and acute, was neither lofty nor profound: he had no constructive, and little receptive, power. Carlyle said truly of him, that he never gave utterance to one great thought. He was immensely vain: he was utterly unscrupulous in attack and in self-protection; and equally unscrupulous in money-getting.

VOLTERRA—VOLTI SUBITO.

As a writer, his favorite weapon was ridicule, and there was never, perhaps, a greater master of it. This brilliant ridicule he constantly turns against the most precious tenets of the Christian faith. In a particular form of polished mockery, V. remains without a rival. His prose is the perfection of French style and of literary form; it is admirable in grace, clearness, vivacity, and alive like sparkling wine with the particular quality of *esprit* peculiar to the people and the language. As a dramatist, V. takes rank as a worthy third with his two great predecessors Corneille and Racine. His most famous poems are the *Henriade*, the one epic of the language; and *La Pucelle*, which is, perhaps, more properly to be styled infamous, such is the profanity and indecency with which the writer has wilfully defiled the heroic story of the Maid of Orleans. In the historical works of V., with the utmost lucidity of method, there appears the superficiality which passed, with him, for philosophy. For narrative charm, his little historiette *Charles Douze* is in its kind a model. —English biographical works on V. are very few. Of his earlier life, a racy and amusing sketch is in Carlyle's *Frederick the Great*, vol. II.; and his relations with Frederick are in that work treated in full, with the writer's characteristic humor and insight.

In 1866 appeared vol. I. of an excellent but unfinished *Life and Times of François-Marie Arouet, calling himself Voltaire*, by Espinasse. The *Life* by Parton (1881) contains a vast mass of facts, but is poor in criticism. See also *Voltaire*, by D. F. Strauss (1870); *Voltaire*, by John Morley (1872); and *Voltaire et la Société du XVIII^e Siècle*, by T. G. Desnoiresterres (8 vols. 1855-76).

VOLTERRA, *vōl-tě'r-râ*: town of central Italy, prov. of Pisa; on a table land about 1,600 ft. above sea-level; 51 m. by rail e.s.e. of Leghorn. It is surrounded by cyclopean walls, in better preservation than any other structures of the kind in Italy. The gate called *l'Arco*, and the remains of baths and of an amphitheatre, are interesting vestiges of antiquity; the cathedral, municipal palace, and *Pretorio* are monuments of the middle ages; and the *Mastio*, a prison, is a modern edifice. V. contains a college, numerous schools, and a library of 120,000 vols. Wine, oil, corn, and mulberry-trees are grown in the lands belonging to the town, which also possesses considerable mineral wealth.—Pop. (1881) 5,347.

V., anc. *Volaterræ*, was one of the most powerful and important of the Etruscan cities, and came into the possession of Rome B.C. 474: after the fall of the empire it suffered much from the invasion of barbarians.

VOLTIGEUR, n. *vōl'ti-zhēr'* [F., a vaulter, a tumbler; *voltiger*, to vault]: in *France*, a light-infantry soldier, one of a picked company of irregular riflemen selected for courage, activity, and small stature: they usually have the place of leaders in the attack.

VOLTI SUBITO, *vōl'ti sō'bī-tō* [It., turn quickly]: in *music*, indication at the foot of a page, to signify that the page ought to be turned without delay.

VOLTRI--VOLUMENOMETER.

VOLTRI, *vôl'trê*: town of n. Italy, prov. of Genoa; 9½ m. w. of the city of Genoa; on the Gulf of Genoa. Its churches are richly adorned; it contains many fine villas, and manufactures paper extensively. Near it are the sulphureous springs and baths of Aqua Santa, very efficacious in cutaneous disease.—Pop. 6,000.

VOLTZINE, n. *vôlt'zîn*, or **VOLT'ZITE**, n. *-zît*: an ore of zinc occurring in quartz-veins.

VOLUBLE, a. *vôl'û-bl* [L. *volūbilis*, that is turned or rolled round—from *volvĕrĕ*, to turn about: It. *volubile*] formed so as to roll with ease, or to be easily set in motion, having quick motion; flowing with ease and smoothness; fluent in speech; in *bot.*, applied to stems, leaf-stalks, and the like, which have the property of twisting around some other body; twining spirally. **VOL'UBLY**, ad. *-blĭ*. **VOL'UBLENESS**, n. *-nĕs*, fluency of speech. **VOL'UBIL'ITY**, n. *-bĭl'î-tĭ*, fluency of speech; aptness to roll.

VOLUME, n. *vôl'ûm* [F. *volume*—from L. *volūmen*, a roll, a book—from *volvĕrĕ*, to turn round any object: It. *volume*: an anc. volume consisted of a single sheet, as of parchment, with a rod stretched across at each end for the convenience of rolling and unrolling in the reading]: a single fold or turn; a document or writing in the form of a roll; a single book; a roll or wreath, as *volumes* of dense smoke; space occupied; bulk or size; compass of voice; fulness or roundness of voice or sound. **VOL'UMED**, a. *-ûmd*, having the form of a volume; in rolling masses, having bulk; great. **VOLUMETRIC**, a. *vôl'û-mĕt'rĭk* [Gr. *metron*, a measure]: relating to measure or volume; performed by measured volumes of solutions of a fixed standard, as *volumetric* analysis. **VOL'UMET'RICALLY**, ad. *-lĭ*. **VOLUMINOUS**, a. *vô-lû'mĭ-nûs* [inid. L. *voluminōsus*]: consisting of many volumes or books; having written much; copious; diffusive; in *OE.*, consisting of many complications. **VOL'UMINOUSLY**, ad. *-lĭ*. **VOL'UMINOUSNESS**, n. *-nĕs*, the state or quality of being voluminous or bulky. **VOLUME DE LUXE**, *dĕh lûks* [F. *de*, of; *luxe*, luxury, magnificence—*lit.*, a volume or book of magnificence]: a volume magnificently gotten up in printing, illustrations, and binding.

VOLUMENOMETER, n. *vôl'û-mĕ-nôm'ĕ-ter* [L. *volūmen*, a volume; Eng. *meter*]: instrument for measuring the volume of a solid body by the quantity of a liquid or of the air which it displaces—thence also for determining its specific gravity: see **AREOMETER**.

VOLUMETRIC ANALYSIS.

VOLUMETRIC ANALYSIS, *vŏl-ŭ-mĕt'rik*, in Chemistry: analysis consisting in submitting the substance to be estimated to certain characteristic reactions—the chemist employing for such reactions liquids of known strength, and, from the quantity of liquid employed to induce the reaction, determining the weight of the substance to be estimated by means of the laws of equivalence. The idea of this method suggested itself first to Gay-Lussac in considering how most readily to determine the amount of silver in an alloy of silver and copper; but the method itself did not come into general use till a considerable time afterward. The liquid reagents of known strength are called *standard solutions*; and the amount employed may be estimated either by weight or by volume, but the latter, being the easiest of application, is universally employed—hence the name V. A. In order that a reaction may be applicable in V. A., it must satisfy these two conditions: (1) it must not occupy much time; (2) the termination of the reaction must be easily recognized and unmistakable to the eye. These conditions limit the number of volumetric processes. In addition to the ordinary chemical apparatus, V. A. requires graduated glass vessels of different kinds for measurement of the standard solutions. Of these the most essential are: (1) *Pipettes*, glass vessels of the form of figs. 1 and 2, intended for the delivery of the standard solution: fig. 1 shows a vessel provided with a single mark upon the neck, while fig. 2 shows one divided and graduated through its whole length into cubic centimetres (c. c.), according to French scale; (2) *Flasks* graduated for the contents in various sizes from one-tenth of a litre to five litres, and used for preparation of standard solutions; (3) *Burettes*, or graduated tubes for measuring liquids used in an analysis. The best burette for general purposes is known as Mohr's Burette (see fig. 3); and its lower part is attached to an India-rubber tube and spring-clamp or clip (*Quetsch-Hahn*). Its principal advantages over other forms are, that its constant upright position enables the operator at once to read off the number of degrees of standard (or test) solution used for any analysis, while the quantity of fluid to be delivered can be most accurately regulated by the pressure of the thumb and finger on the clamp; moreover, as it is not held in the hand, no error is likely to arise in the measurement from the heat of the operator's hand. Its greatest drawback is that it cannot be used for those test-solutions which decompose India-rubber.

The *standard solutions*, known also as *test* or *titrated solutions* [from F. *titre*, which signifies the standard of a coin], may be divided into: (1) such as are immediately prepared by weighing a substance of known composition, dissolving it, and diluting it to the required volume; (2) such as are prepared by approximate mixture and subsequent exact analysis. The greatest care is indispensable regarding both the graduation of the measuring instruments, and the strength and purity of the standard solutions which must be protected from evaporation and other

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hurtful influences by being kept in bottles of 1 or 2 litres' capacity, provided with well-ground stoppers.

Volumetric methods are usually classified as follows, according to the principles on which they are based: (1) *Analysis by saturation*, when the quantity of a base or an acid is measured by the quantity of acid or base required for exact saturation—a point to be determined by test-papers, tincture of litmus, etc. (2) *Analysis by oxidation and reduction*, when the quantity of the substance to be

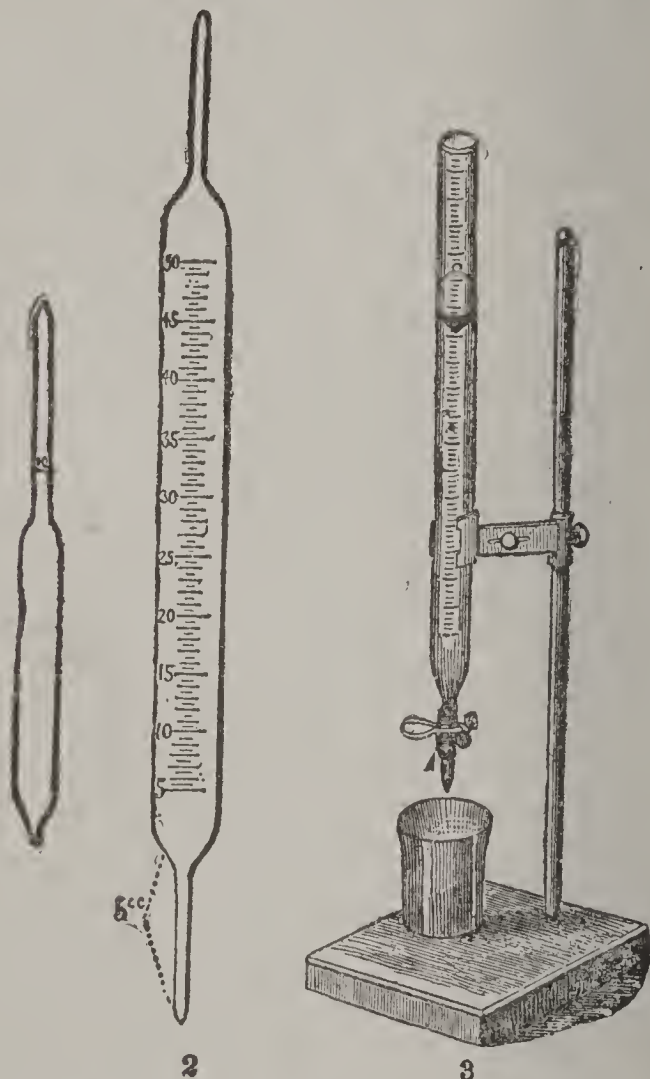


Fig. 1.—A Pipette, containing 10 c. c.

Fig. 2.—A Pipette, containing 50 c. c., divided through its whole length in c. c.; being thus graduated for measuring the delivery of fluids.

Fig. 3.—*a*, the India-rubber; *b*, the slips made of brass wire, by which the India-rubber tube can be closed at will.

determined is found by the quantity of chlorine, bromine, iodine, or oxygen to which it is equivalent (regarded as oxidant); or by the quantity of chlorine, bromine, iodine, or oxygen which it requires to pass from a lower to a higher stage of oxidation: the chief oxidizing agents are permanganate of potash and bichromate of potash; while the reducing agents chiefly used are protoxide of iron and hyposulphite of soda. (3) *Analysis by precipitation*, when the determination of a substance is effected by precipitating it in some insoluble and definite combination. We

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have space for an example of only one of these three forms; and, selecting the last for its historic interest in its application to the determination of silver, we give Sutton's account of the process: 'Suppose that it is desirable to know the quantity of pure silver contained in a coin. The coin is first dissolved in nitric acid, by which means a bluish solution containing silver, copper, and probably other metals, is obtained. It is a known fact that chlorine combines with silver in the presence of other metals to form chloride of silver, which is insoluble in nitric acid. The proportions in which the combination takes place are 35.5 of chlorine to every 108 of silver; consequently, if a standard solution of pure chloride of sodium is prepared by dissolving 58.5 grains of the salt—i.e., 1 eq. sodium (= 23) *plus* 1 eq. chlorine (= 35.5) or 1 eq. chloride of sodium—in so much distilled water as will exactly make up 1,000 grains by measure, every single grain of this solution will combine with 0.0108 of a grain of pure silver to form chloride of silver, which precipitates to the bottom of the vessel in which the mixture is made. In the process of adding the salt solution to the silver, drop by drop, a point is at last reached when the precipitate ceases to form. Here the process must stop. On looking carefully at the graduated vessel from which the standard solution has been used, the operator sees at once the number of grains that have been necessary to produce the complete decomposition. E.g., suppose the quantity used was 520 grains; all that is necessary to be done is to multiply 0.0108 grains by 520, which shows the amount of pure silver present to be 56.16 grains.'—By V. A. as compared with ordinary analysis, much time, labor, and expense are saved; at the loss, however, often of due accuracy, unless the greatest care be taken that the standard solutions are of due strength, and the instruments accurately graduated. An analysis can thus be completed in 15 minutes that would formerly have occupied a day or more. Independently of its application to pure chemistry, it facilitates to a great extent the chemical analysis of urine, of waters, of manures, soils, etc.—See handbooks of analytical chemistry, in particular Mohr's *Lehrbuch der Chemischen Titrimethode*, and Rieth's *Volumetrische Analyse*.

VOLUNTARY—VOLUNTARY CONVEYANCE.

VOLUNTARY, a. *völ'ün-tér-ì* [L. *voluntarius*, voluntary—from *voluntas*, free will—from *volo*, I will: It. *volontario*: F. *volontaire*]: acting from choice; having power of choice; proceeding from one's own will; done without compulsion; characterized by volition; of or pertaining to voluntarism: N. one who does anything of his own free will; a volunteer; a piece of music played at will; one who holds that the ordinances of religion should be supported by free-will offerings, and that the church should be entirely independent of the state in regulating its own affairs (see **VOLUNTARIISM**). **VOL'UNTARILY**, ad. *-tér-ì-lì*, of one's own accord; spontaneously; without compulsion. **VOL'UNTARINESS**, n. *-nès*, the state of being voluntary or optional. **VOL'UNTARIISM**, n. *-tér-ì-izm*, system or practice of supporting the ordinances of religion by voluntary contributions, as opposed to compulsory rates or taxes, or by endowments (see below). **VOL'UNTEER'**, n. *-tēr'*, one who enters on any service or undertaking of his own free will; specifically, one who enters into the military or naval service from choice, and not from constraint or compulsion: ADJ. of or pertaining to volunteers: V. to offer without solicitation or compulsion, as aid or services; to serve as a volunteer. **VOL'UNTEER'ING**, imp. **VOL'UNTEERED'**, pp. *-tērd'*. **THE VOLUNTEERS**, the great defensive citizen force of Great Britain, able-bodied men in every rank of civil life, who have volunteered to give their services in defense of the country in case of threatened invasion, and who without pay devote a portion of their time to acquiring military drill and the use of arms, and are, under certain conditions, furnished with arms and accoutrements, etc., at public expense, as forming part of the army (see **VOLUNTEERS: WAR SERVICES**).—**SYN.** of 'voluntary, a.': spontaneous; willing; gratuitous; intentional; purposed.

VOL'UNTARY CONVEY'ANCE, in Law: transfer of property, real or personal, without any valuable consideration. V. C. comes into question mostly in cases of bankruptcy, when a debtor's estate is insufficient to meet the claims of creditors. The first English statutes regarding V. C. were 13 Elizabeth c. 5, for protection of creditors, and 27 Elizabeth c. 4, for protection of subsequent purchasers: the law as determined in Elizabeth's time is accepted generally throughout the United States even where it has not been re-enacted in statutes. At one time a V. C. made when the maker of it was a debtor, even if he possessed many times the amount of the debt, was held fraudulent within the intent of 13 Elizabeth c. 5; but now the proportion of the debt to the whole estate is taken into account, and V. C. is not regarded as *prima facie* fraudulent unless the property conveyed constitutes a large ratio of the debtor's estate. V. C. is not void as regards a debt due to a subsequent creditor (i.e., one who becomes creditor *after* the V. C. unless the V. C. be actually fraudulent.

VOLUNTARYISM.

VOLUNTARYISM: principles or system of polity distinctive of those who advocate the separation of church and state; the cessation of state endowments and state grants for religious purposes, and, in general, of all interference, patronage, or exercise of authority on the part of the civil power in the religious and ecclesiastical affairs of the subject. The terms Voluntaryism and Voluntary have been in use in Great Britain since the keen discussions between Presb. churchmen and dissenters in Scotland, in the second decade of the 19th c., regarding civil establishments of religion—commonly called the ‘Voluntary Controversy.’ V. may be regarded as the formula of advanced Protestantism, the corrected doctrine of church and state, which the failure of the experiment of national churches has forced on public thought. It is a protest in modern language against the encroachment of the temporal power, whether under the name of magistrate, nation, or political majority, on the rights and liberties of individual conscience. It has sometimes been erroneously considered the offspring of theological neutrality; but its leading advocates base it on the expressed law of Christ respecting the constitution and administration of his church, as well as on the rights of conscience, the nature of civil government, and considerations of general equity and policy. V. in its relation to strictly ecclesiastical organizations (churches) is scarcely a question in the United States—inasmuch as its main principles are heartily accepted by the people generally, and have been from the beginning embodied to a large degree in national and state laws. In Great Britain and some other European countries this question is still under earnest discussion.

In its most extensive sense, V. embraces the whole question of the relation of the state to religion and the church. Its advocates admit that magistrates as well as other men, being under law to God, ought to execute their official duties in a spirit and by methods obedient to the law of God; but they declare that the nature and design of civil government exclude the civil magistrate from any function in the domain of religion and conscience. His authority cannot properly extend beyond the secular concerns of individuals and of society. Magistrates, though, like other men, under obligation to seek and to follow the highest available guidance in duty, are not thereby empowered to convert the rules of the Divine Word, addressed exclusively to the individual conscience, into formal laws for civil society. God alone being lord of the conscience, such laws only—though revealed in His Word—may be adopted and enforced in civil society as are requisite for its outward preservation, peace, and good order, and for the advancement of its secular interests. While, therefore, magistrates ought, as individuals, to embrace and profess the religion of Christ, it is no part of their political or official duty or right to emit, adopt, prescribe, or enforce a confession of faith; neither is it within their province to aim at establishing or propagating Chris-

VOLUNTARIYISM.

tianity by the civil arm, to provide for, endow, or subsidize its teachers either in churches or schools; but it is their duty impartially to protect all their subjects, of whatever creed, in the enjoyment of full religious liberty, so long as their manner of exercising this civil right does not infringe on the equal rights of others. As to the support of the church, the magistrate can possess no right to demand from any person any portion of his possessions for religious uses, or to apply to such uses the proceeds of taxation imposed for general ends. Civil society being promiscuous and variable in its constituents, a fixed arrangement for endowment of religious bodies out of the public funds is a fixed usurpation—as a system of occasional grants is an occasional usurpation—on the liberty and property of all who dissent. Even existence of an absolute unanimity among the citizens on matters of religion—were that possible—could not justify such interference with religion in its economics. The pecuniary supplies required for religious objects are to be secured solely through moral influences and sacred motives. Truth, as well as error, must be left to provide for itself. These views express what may be called ecclesiastical Voluntariyism.

On the question of education, various shades of opinion exist among the advocates of V.; but all are agreed that the religious education of the young belongs to the parent and the church, and is to be neither provided nor superintended by the state. How to secure this principle in connection with a system of national schools or government grants for education, continues to be the problem of V.—Some seek the solution in a plan of local boards representing the parentage and community, who shall manage the schools and decide the character of the teaching; and of these, some advocate separation of the hours for religious and secular lessons.—Others, who think that, though by these methods state superintendence may be avoided, state aid is yet directly or indirectly received for religious instruction, advocate a system providing for schooling in only secular or common branches.—Others, known in Britain as Voluntary educationists, reject the idea of any national system—some on account of the religious difficulty, others on grounds connected with the philosophy of education and the theory of government. Voluntary educationists would leave the education of the poor to be secured by the operation of those influences which provide other necessary and benevolent measures: the education of the children of classes not necessitous they expect to flow from private enterprise and free association.—V. if consistently carried out will object to grants to denominational schools dependent on the condition of teaching religion; also to grants to semi-religious institutions; as well as to the appointment and payment by the state of chaplains for prisons, the army, navy, etc.—See EDUCATION, NATIONAL OR STATE.—In reference to the Sabbath, holding the sacred character of the day, some advocates of V. appear to admit that the magistrate is entitled and bound not only to make it a *dies non* in his own depart-

VOLUNTEERS.

ment, but also to prohibit labor and amusements throughout his official sphere. Others, equally holding the sacredness of the day, with more regard to strict theory, deny to the state the power of inflicting pains and penalties, however mild, in a matter radically religious, at the same time that they assert the obligation of the state to secure all its members due protection and facility in the practice of their worship, and to make such laws for this end as may be fit, in view of prevailing religious observances: see LORD'S DAY, THE: SABBATH.—Regarding national fasts and thanksgivings, V. involves the assertion that governmental proclamation of these should be in the style not of command but of invitation; while some deny that it forms any part of magisterial *duty* to issue such appeals, or that such appeals impart a national character to the service—inasmuch as ordinary political acts become national when done by the proper national organs; but no religious acts can acquire a national character except as they are participated in by the body of the people: when this is the case, the exercise is national, though not evoked by the call of the chief of the state; and it is not made more national by that call.—On the question of marriage, V., recognizing its character as a civil transaction, demands that all religious parties stand on the same level in regard to it. Withholding legal sanction from all immoral connections, and punishing breaches of the lawful contract in wedlock, magistrates are not warranted to visit with penalties any mere departure from the standard prescribed to Christian conscience or embodied in ecclesiastical law.—Political V., as it is sometimes called, is simply V. expressed in the language of the politician—the doctrine of the entire religious equality of all citizens in the eye of law, stated and defended without reference to specific religious opinions.

This subject is both profound and complicated; and it is conceivable that the best practical dealing with it will be found along lines not strictly subjected to *doctrinaire* theories on either side.

VOLUNTEERS': in the United States, citizens rendering service as soldiers in bodies outside the regular army, and included in one of two classes: (1) such companies, battalions, regiments, etc., of the Militia (q. v.) of the several states as are actually called into the service of the U. S. govt.; (2) troops raised by the several states in obedience to act of congress requiring each state to furnish its quota of men on occasions of national emergency. The term V. does not include the militia of the several states—whether simply enrolled, or also uniformed, armed, disciplined, and organized—except as they are called into actual federal service.—See MILITIA: RESERVE, in Military, etc.—Both the above classes of V., when in the federal service, are controlled solely by the U. S. govt., under the same rules and articles of war with the regular army, and are practically U. S. troops. They are paid by the federal govt.—The V. in the U. S. service during the civil war numbered 2,690,401, enlisted for various terms and on different conditions—i. e., for 3 years or for shorter service. The number

VOLUNTEERS OF AMERICA—VOLUPTUOUS.

At V. enlisted for 3 months' service (call of 1861, Apr. 15) was 91,816; of 9 months' men (call of 1862, Aug. 4) 87,588; of 100 days' men (1864, Apr. 23—July 18) 83,612. When the war was ended, the number of V. in the service was 978,000.—In the several states and territories are bodies of 'uniformed militia,' 'national guards,' etc.: these troops correspond to the corps known in England as 'Volunteers.' At the end of 1890 the 'uniformed militia' of the several states and territories was officially reported to consist of 101,981 enlisted men, with 9,311 officers.

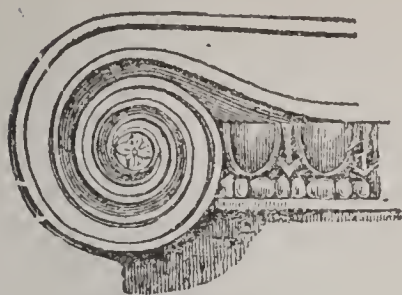
VOLUNTEERS OF AMERICA, THE: religious organization, outgrowth by secession from the Salvation Army (q.v.). In 1888 Ballington Booth, son of Gen. William Booth, was appointed commander of the American branch of the Salvation Army. In 1896 he and his wife were suddenly recalled to London. To the demand of his return, Commander Booth replied that he would resign his keys, books, and offices, but refused to further accede except on certain conditions to which his father would not agree. A movement of public protest against his recall was at once started by prominent citizens of New York who appreciated the good work that the commander and his wife had done in America, and a telegram, authorized at a public meeting, was sent to London advising his retention in America, to which the chief sec. of the army in London replied that experience had taught the leaders of the army that if a commander remained at one post more than four or five years the work was likely to stagnate. Eventually Commander Booth resigned his commission, and in March Frederick St. Clair de la Tour Tucker, a son-in-law of Gen. Booth, was appointed in his place.

All the circumstances attending the resignation of Ballington Booth and all the reasons for it are not and probably never will be generally known. A strong following in the army signified its desire to help him form a new army or similar organization, and he and his wife immediately set about doing so. The new organization was first named 'God's American Volunteers,' but was subsequently officially called 'The Volunteers of America.' At the end of the first year of its existence, the new organization reported that posts had been established in more than 120 cities, 150 separate societies had been formed, and there were 450 commanding officers.

VOLUPTUOUS, a. *vō-lŭp'tū-ŭs* [*L. voluptuōsus*—from *L. voluptas*, enjoyment, pleasure—from *volup*, agreeably—from *volo*, I wish: *F. voluptueux*]: given to the enjoyment of luxury and pleasure; indulging in sensual gratifications; producing, or expressive of, the sensuous; contributing to sensual pleasure; sensual. **VOLUP'TUOUSLY**, ad. *-lī*. **VOLUP'TUOUSNESS**, n. *-nēs*, indulgence in sensual pleasures. **VOLUP'TUARY**, n. *-ēr-ŭ*, a man who indulges in, or is addicted to the pursuit of, sensual pleasures: a sensualist: **ADJ.** devoted to luxury or pleasure.

VOLUTE—VOLVA.

VOLUTE, n. *vō-lūt'* [F. *volute*—from mid L. *volūta*, a volute—*from* L. *volūtus*, pp. of *volvērē*, to turn round, to roll]: a kind of spiral scroll used in ornaments; the spiral scroll forming the principal ornament in the Ionic, Corinthian, and Composite capitals—derived probably from Assyrian architecture, in which also it is used: a species of spiral shell, a member of the genus *Voluta* and



Volute.

family *Volutidæ* (q.v.), or the fish which inhabits such a shell. **VOLU'TED**, a. *-lūt'ēd*, having a spiral scroll. **VOLU'TION**, n. *-shūn*, a spiral turn or wreath.

VOLUTIDÆ, *vō-lūt'i-dē*: family of gasteropodous mollusks, of the section *Pectinibranchiata*: the V. all are marine; and have a spiral shell turreted or convolute, aperture notched in front, *columella* obliquely plaited, no operculum. The animal has a very large foot and a recurved siphon. The species are numerous, chiefly in tropical seas. Many have very beautiful shells, prized by shell-collectors. This genus makes its appearance in the Cretaceous strata, and increases in numbers in Tertiary deposits, no less than 50 species being known in the Pleistocene beds.

VOLVA, n. *vōl'vā* [L. *volva*, a wrapper]: in *bot.*, the involucre-like base of the stipes of agarics, which was originally the bag enveloping the whole plant.

VOLVOX—VOLVULUS.

VOLVOX, *vòl'vòks*: genus of minute organisms, type of a family, *Volvocineæ*, ranked formerly as *Infusoria*, but now, as being vegetable, ranked among *Protophytes*: they are globular, or nearly so, are found in stagnant water, and move slowly through the water, revolving round an axis, by the agency of numerous Cilia (q.v.), which project from their surface; one pair arising from each of the numerous component cells of the sphere, and passing through their common gelatinous envelope. Both sexual and asexual multiplication takes place; in the former case certain cells enlarge to form oospores, while others divide and re-divide, so producing a mass of tiny segments, which are set free as ciliated antherozoids, and unite with the oospores, which ultimately divide to form new colonies. In asexual multiplication eight cells of the ball undergo repeated division, so forming new spheres, which are set free by the breaking up of the parent. These frequently exhibit, even while within the parent globe, a rotatory motion similar to its own. The presence of starch in the interior of the *Volvocineæ* has been detected by means of iodine, and is regarded as a conclusive proof of their vegetable nature. The most common and best-known species is *Volvox globator*, which is just visible to the naked eye, and reveals its structure only under the microscope. It is a transparent sphere, having its surface studded with innumerable green spots, united by a beautiful network: 6 to 20 young often are seen in its interior.

VOLVULUS, n. *vòl'vũ-lũs* [L. *volvo*, I roll or twist]: in *medicine*, term denoting a twisting of the intestine, producing obstruction to the passage of its contents. A disorder of a different kind, but with similar symptoms and often similar results, is Intussusception (q.v.). There are three distinct varieties of rotatory movement capable of giving rise to volvulus—(1) A portion of intestine may have become twisted on its own axis, and in that case even semi-rotation brings the intestinal walls into contact, so as to close the passage: this is a rare condition, occurring only in the ascending colon. (2) The Mesentery (q.v.), or a part of it, may be twisted into a cone, dragging the intestine with it; the mesentery being the axis, and the intestine being rolled up on it: this form occurs in the small intestine. (3) A single portion or a coil of intestine may afford the axis round which another portion with its mesentery is thrown, so as to compress it, and close the passage. A coil of small intestine, the sigmoid flexure or the cæcum (see DIGESTION, ORGANS OF), may form the axis.—All these varieties occur chiefly in advanced life, and their seat is commonly toward the posterior unyielding wall of the abdominal cavity, the smoothness and yielding nature of the parts anteriorly rendering such an event almost impossible. The *symptoms* of twisting of the intestines, especially of the sigmoid flexure, the most common seat of the affection, are usually distinctly marked from the beginning. Great pain is suddenly experienced in a small circumscribed spot of the abdomen, obstinate constipation usually setting in from that date. If the sigmoid flexure, which lies just

VOMER—VOMIT.

above the rectum, is the seat of the twisting, the abdomen soon becomes distended, especially on the left side, the distention being much more marked than when the twist is in the small intestine, as might physiologically have been expected. Vomiting, often constant and copious, is usually present. These cases are so desperate in their nature that it is needless to enlarge on their treatment. Attempts to remove the displacement by injecting water or air into the intestine through a long tube have often been made, but with slight success. Operations for relief of this and other intestinal obstructions, e.g., intussusception, have until recently been very often fatal; but of late the progress of surgery—especially in connection with antiseptics—has greatly reduced the ratio of fatal results. Intestinal obstructions produced either by V. or by other causes have been successfully treated by surgical means; diseased portions of the intestine (e.g., the appendix vermiformis) have been cut out, and the separated parts reunited by sewing (enterorrhaphia).—In the treatment a few rules are universally applicable—viz., wherever symptoms such as above described occur, aperients should be given only by the rectum, while opium should be freely given by the mouth. Leeches and hot fomentations should be applied to the seat of pain; and all solid food should be prohibited, the nourishment being given solely in fluid form.

VOMER, n. *vō'mēr* [L. *vomer*, a plowshare]: in *anat.*, the slender thin bone separating the nostrils from each other. VO'MERINE, a. *-mēr-in*, relating to the vomer.—The *Vomer* in the human subject forms part of the middle partition of the nose, and the lower edge fits into grooves between the apposed surfaces of the palatine processes of the upper jaw and palate-bones. The V. exhibits many modifications in different classes of *Vertebrata*. The presence or absence of teeth on the vomer, i.e., along the middle line of the roof of the mouth in fishes, often forms a very important character.

VOMICA, n. *vōm'ī-kā* [L. *vomica*, a sore or ulcer]: an abscess of the lungs—so called because it discharges diseased matter. Vom'IC, a. *-īk*, ulcerous.

VOMICA, VOMIC NUT, n. *vōm'īk*: see NUX VOMICA.

VOMIT, v. *vōm'it* [L. *vomitus*, pp. of *vomĕrē*, to vomit: akin to Skr. *vam*, to vomit: It. *vomire*: F. *vomir*]: to eject or throw up the contents of the stomach; to discharge from the stomach through the mouth; to throw up with violence from any hollow or recess: N. the matter ejected from the stomach; an emetic. VOM'ITING, imp.: N. the act of ejecting from the stomach; the act of throwing out substances from a deep hollow, as a volcano; that which is vomited. VOM'ITED, pp. VOM'ITIVE, a. *-ī-tiv* [F. *vomitif*]: causing vomiting; emetic. VOMITO, n. *vō-mē'tō* [Sp.]: the same as black vomit. VOM'ITORY, a. *-tēr-ī*, causing vomiting: N. an emetic; in *anc. times*, the door of a large building by which a great assemblage of people could be let out. BLACK VOMIT, a name given to yellow fever from the vomiting of black matter which attends it at the last.

VOMITING.

VOMITING: emptying of the stomach through the gullet and mouth, effected by abdominal contraction or stomachal action, or both. V. is preceded by a feeling of nausea, a flow of saliva in the mouth, and the breaking out of perspiration; the countenance grows pale, a feeling of weakness spreads over the whole body, and the pulse becomes slow. At last the muscles of the abdomen and the diaphragm strongly contract, and the contents of the stomach are ejected with more or less violence. The first matters to be ejected are the food and drink present, then mucus from the stomach and œsophagus, lastly bile from the duodenum. In cases of disease, abnormal substances are sometimes vomited, such as blood, fragments of the intestines, and even excrementitious matters. When the V. is ended, it is followed by languor and drowsiness; or, if the excitement was inconsiderable, the usual state immediately returns.

The causes of V. are various. In the first stages of infancy it is almost normal, and occasions no disturbance of the system. In many animals, too, it is a normal function of life, as when birds of prey reject the hair and feathers of their victims. The infant rids itself of the superabundant milk that it swallows by throwing it up with no trouble. Some persons can excite themselves to vomit by swallowing air.—The immediate causes of V. may be reduced, according to Dr. Carpenter, to the three following categories: (1) The contact of irritating substances with the mucous membrane of the stomach itself; these, however, cannot act by *direct* stimulation on more than its own muscular coat; and their operations on the associated muscles must take place by *reflexion* through the nervous circle furnished by the pneumogastric and the motor nerves of expiration. (2) Irritations applied to other parts of the body, likewise operating by *simply-reflex* transmission—as in the V. consequent on the strangulation of a hernia, or the passage of a renal calculus; or in that excited by injection of tartar emetic or emetin into the circulating current, when these substances probably produce their characteristic effect by their operation on the nervous centres. [Here might be added the mental disturbance of motion on shipboard, reacting through the sympathetic nerves on the stomach, producing sea-sickness, from which it is said that one can be preserved if he keeps a sense of the true level or horizon, and makes mental allowance, consequently, for all pitching or careening of the ship's level.] (3) Impressions received through the *sensorial* centres, which may be either sensational or emotional, but which do not operate unless they are *felt*. In this mode seems to be excited the V. that is induced by tickling the fauces, which first gives rise to the sensation of nausea; as well as the V. consequent on disgusting sights, odors, or tastes; also (according to some writers) the V. consequent on those peculiar internal sensations preliminary to sea-sickness. The *recollection* of these sensations, conjoined with the emotional state which they originally excited, may itself become an efficient cause of the action, at least in individuals of peculiarly irritable

stomachs, or of highly sensitive nervous systems.—According to the oldest doctrine respecting V., it was held to arise solely from convulsive movements of the stomach, which was thought to take on a motion contrary to the usual peristaltic motion. Bayle advanced the opinion that the stomach is quite passive in the operation, and that its contents are emptied entirely by its being compressed through the contractions of the abdominal muscles and the diaphragm. An apparently conclusive experiment of Magendie's, in which the stomach was removed, and a bladder substituted for it, had afterward (1813) satisfied most physiologists as to the passiveness of the stomach in V., until Bécларd and Budge showed the insufficiency of his experiment. It is found, in fact, that in V. there are two sets of actions—(1) contractions of the abdominal walls, while the diaphragm remains fixed and forms a support to the stomach; (2) the stomach itself performs jerking movements, the pylorus, or inferior orifice, at the same time closing, while the cardiac sphincter relaxes, without which last-named action V. is impossible—and that either of the two kinds of movement—the abdominal or the stomachal—may eject the contents of the stomach into the gullet.

In the treatment of V., it must be considered as a symptom rather than as a malady. Where the stomach is irritated, relief is afforded, according to circumstances, by drinking cold water, aerated or soda water; or, if necessary, by opium or *nux vomica*. Cold applications outwardly also do good. In other cases, infusions containing ethereal oils—camomile, coffee, etc.—astringents, or correctives for acidity—magnesia, soda, etc.—are the fitting remedies. When the irritation is in the brain, the best remedy is a horizontal position, with composure and darkness. If a person in sound health is suddenly seized with V., poisoning may be suspected.

VONDEL, *von'del*, JOOST VANDEN (pron. *yōst*): the greatest of Dutch poets: 1587, Nov. 17—1679, Feb. 5; b. Cologne, whither his parents, who were Anabaptists, had fled from persecution in Antwerp. His maternal grandfather, Peter Kranen, was one of the poets of Brabant. When freedom began to raise its head in Holland, the elder V. removed with his family to Utrecht, and afterward to Amsterdam, where he prospered in trade. The poet's education in boyhood was limited to reading and writing; but his studious perseverance gave him in after-life intimate acquaintance with ancient and modern literature. At the age of 13, V.'s poetical efforts were praised by Hooft. In his 23d year he married Maria de Wolf, to whose clever management chiefly he left his business as a hosier, while he applied himself to study and poetry. The tragedies of V. are numerous, and the grandest specimens of Dutch literature. His satirical writings and epigrams are full of fire, energy, and spirit. One of his most remarkable pieces is *Lucifer* (1654), strikingly resembling Milton's *Paradise Lost*, which appeared 13 years later. V. was earnest and active in favor of the Remonstrants, Grotius and Olden-

VOODOO.

barneveld, drawing on himself the anger both of the Calvinistic clergy and of the court, whom he attacked with the keenest satire: see ARMINIUS, JACOBUS.

Gysrecht van Aemstel; Adam in Banishment; Palamedes; The Batavian Brothers; Solomon; Samson; Adonijah; Noah, or the Destruction of the Old World; Mary Stuart; etc., are splendid efforts of genius. *The Harpoon, The Horse-comb*, and the *Decretum Horribile* are stinging satires on the ruling powers in church and state. V.'s translations from the Greek and Roman writers are numerous—the *Metamorphoses* of Ovid having been rendered into Dutch verse when he was 84 years old. V. left almost no subject untouched, no measure untried. His works (9 vols. quarto) contain many sea-songs and more than 100 odes. Many of the later poems were written with a strong Rom. Cath. spirit, he having joined that church about 1640. Through the imprudences of his son, to whom he had given his business, V. fell into sadly straitened circumstances, and when past the age of 70 years (1658) accepted a situation as a hard-working clerk in the city pawn-broking office. In 1668 the magistrates allowed him to retire with his salary of 650 guilders yearly, which kept him above want. He was of moderate stature, well made, and had an eagle eye. After his powers of body and memory had begun to fail, he could still read without glasses. He kept his calmness and good-humor to the last; and died at the age of 91, and was carried to his resting-place in the New Church, Amsterdam, by fourteen poets.

VOODOO, n. *vó'dô*, or HOODOO, *hó'dô* [African word, or possibly a corruption of F. *Vaudois*, name of a people who, being heretics, were accused in mediæval times of witchcraft (see WALDENSES)]; a spell, enchantment, witchcraft, or other magical performance—used almost exclusively to denote magical rites practiced by negroes: V. to practice witchcraft, etc., after the manner of the negroes. VOO'DOOISM, n. the body of superstitious and magical beliefs and practices obtaining under that name almost exclusively among the negro population of the s. United States and W. Indies. The practice of voodooism differs, but not in essential particulars, between one locality and another; its objects are ever the same. In some localities it comprises serpent-worship; in others its chief mode is *imaginatio*—the practice of wreaking vengeance on an enemy by stabbing, hacking, and otherwise maltreating an image of the person against whom the evil intent is directed; or voodooism may retain traces of cannibalism, as when the rite requires the drinking of a portion of human blood. In short, it is an aboriginal African religious system, retaining some hold on the negro's mind side by side with some amount of Christian belief, each influencing each. Voodooism comprises, in addition to the arts of maleficent magic mentioned above, the art of compounding philters or love-potions. It is practiced by 'voodoo doctors' or 'voodoo priests,' and the people in each more or less definitely circumscribed district usually recognize a voodoo chief (voodoo king or queen).

VOORHEES—VORARLBERG.

VOORHEES, *vôr'hêz*, DANIEL WOLSEY: U. S. senator: b. Butler co., O., 1827, Sep. 26. Having graduated at Asbury (now De Pauw) Univ., Ind., 1849, he studied law, and began practice 1851. He was democratic candidate for congress 1856, but was defeated; was U. S. dist. atty. for Ind. 1858-61, and in the mean while defended in a Va. court John E. Cook, one of John Brown's associates in the affair at Harper's Ferry. He was elected to congress 1861, and served three terms till 1866; again he was a member of the house of representatives 1869-73. He became U. S. senator 1877 to fill a vacancy; then was elected for the full terms 1879-85 and 1885-91. V. was widely popular as a very forceful political orator. He died 1897, Apr. 9.

VOORLOOPER, n. *vôr-lûp'êr* [Dut. *voor*, before; *looper*, a runner, an express]: in *s. Africa*, the man who goes before a bullock-train to lead the animals; hence the leader.

VOPADEVĀ, *vo-pa-dā'va*: celebrated grammarian of India; whose date, given by some as the 12th c., is, according to Burnouf's investigation, the second half of the 13th c. He wrote a grammar entitled *Mugdhabodha*, held in high repute, especially in Bengal: it was commented on by *Durgadāsa* (text and commentary ed. at Calcutta 1861). It differs from the great work of Pāṇini (q.v.) in arrangement and terminology, and is of far less value, though very serviceable in giving many later Sanskrit formations. V. composed other works; and a general though doubtful tradition makes him author of the *Bhāgavata-Purāṇ'a*.

VORACIOUS, a. *vô-râ'shûs* [L. *vorax* or *vorācem*, swallowing greedily—from *voro*, I swallow up: It. and F. *vorace*]: eating or swallowing greedily; ravenous; very hungry; rapacious; ready to swallow up. **VORA'CIOUSLY**, ad. *-lî*. **VORA'CIOUSNESS**, n. *-nês*, or **VORAC'ITY**, n. *-râs'î-tî*, greediness of appetite.

VORANT, *vô'rânt*, in Heraldry: devouring or swallowing: as, sable, a dolphin naiant, *vorant* a fish proper.

VORARLBERG, *fôr-ârl'bêrg* [the land in front of Arlberg, a mountain in the Algau Alpine system]: district administratively united with the Austrian crown-land Tyrol (q.v.), but retaining part of its ancient autonomic institutions; bounded e. by Tyrol, s. by the Swiss canton Graubünden, w. by the principality of Liechtenstein and the canton of St. Gall, n. by Bavaria; 1,005 sq. m. Where the land approaches the Lake of Constance and the Rhine and in the valley of the Ill, the country is a fertile plain; the rest is alpine. About one-third of the surface is forest (Bregenzer Wald). Cattle and timber are the chief products. The manufacture of cotton fabrics is a considerable industry in V., employing 180,000 spindles and 4,000 power-looms; a home industry for the women is the manufacture of embroidery for insertions, edgings, etc. Bregenz, the cap., is a centre for manufacture of wooden-wares. V. has, as a reminiscence of its ancient condition as an independent state, its own assembly or Landtag, consisting of 19 members, one representing the chamber of commerce, 4 the towns, and 14 the parishes.—Pop. (1890) 116,073.

VORONEZH—VORTEX.

VORONEZH, or **VORONEJE**, *vo-rō-nězh'*, or **VORONETZ**, *vō-rō-něts'*: government in the south of Great Russia, bounded s. by Little Russia and S. Russia; 25,448 sq. m. It is traversed by the Don from n. to s.e., which with its two navigable tributaries, the Voroneje and Khoper, waters V. for more than 400 m. The soil, mostly black mold, is generally fertile; producing, for local supply and for export, great crops of grain—wheat, rye, barley, oats, and millet. Cattle and horses of good breed are reared; the best studs belong to the crown. The principal manufactured articles are brandy, beer, cloth, beet-root, sugar, skins, wax-candles, soap, tobacco, and potash: grain, tallow, hemp-seed, cattle, and horses are exported to Moscow, St. Petersburg, etc.—Pop., largely Little Russian in the s.w. and Great Russian elsewhere, (1860) 1,974,400; (1883) 2,532,840; (1889) 2,588,933; (1897) 2,546,255.

VORONEZH, or **VORONEJE'**, or **VORONETZ'**: town of Great Russia, cap. of the govt. of V.; on the right bank of the V.; 150 m. s.w. of Tambov, 365 m. by rail s. of Moscow. It was founded 1586 as a bulwark against Tartar invasion. Peter the Great, who had visited the town, built a fortress and a dockyard here 1694. Besides two cathedrals, the town has many important civil, ecclesiastical, and educational institutions. The commerce is extensive—the chief articles of trade being grain, hemp-seed, and tallow.—Pop. (1860) 39,800; (1885) 56,185; (1897) 84,146.

VORTEX, n. *vawr'těks*, **VOR'TICES**, n. plu. *-tĭ-sēz* [L. *vortex* or *vorticem*, a whirlpool—from *verto*, I turn]: a whirling or circular motion of water, air, or such material as sand, forming a kind of cavity in the centre of the circle; an eddy or whirlpool; in *Cartesian phil.*, a collection of particles of a subtile matter, pervading space and having a rapid rotatory motion round an axis (see below). **VOR'TICAL**, a. *-kāl*, whirling; rotatory; also **VOR'TICOSE**, a. *-kōs*. **VOR'TICALLY**, ad. *-lĭ*. **VORTEX-WHEEL**, a turbine. **VOR-TIGINOUS**, a. *vawr-tĭj'ĭ-nŭs*, having the character of a vortex or whirlpool; whirling; rotatory.—The theory of *Vortices* or eddies has only in comparatively recent times been properly brought under the domain of mathematical analysis. Even now the problem has been only partially solved by the labors chiefly of Stokes (q.v.) and Helmholtz (q.v.), as their investigations apply only to *perfect fluids*—i.e., fluids which oppose no frictional resistance to change of shape. In ordinary motions of perfect fluids, e.g., in currents and waves, the instantaneous change of shape of a small spherical portion makes it an ellipsoid by simple extensions and compressions *without* rotation. The essential characteristic of vortex-motion is, that it involves rotation of some parts of the fluid. Helmholtz has shown that this rotational or vortex motion remains with the parts of the fluid which first have it, and cannot be transferred. We can conceive no process by which vortex-motion could be given to, or taken from, a perfect fluid; for, to our reason, fluid friction (which does not exist in a perfect fluid) would seem indispensable. The smoke-rings are well known which are produced when a mortar is fired;

VORTEX.

or when, on a smaller scale, a bubble of phosphuretted hydrogen takes fire in air, or a smoker skilfully emits a puff of tobacco-smoke. A simple mode of producing them, on even a large scale, is to bore a hole in one side of a box, remove the opposite side, and substitute a cloth or sheet of India-rubber for it: a slight blow on this membrane ejects a vortex-ring from the hole. To make this vortex visible, we may burn phosphorus or moistened gunpowder in the box; or, better, sprinkle its interior with ammonia, and introduce a vessel containing common salt and sulphuric acid: the sal-ammoniae cloud which fills the box is

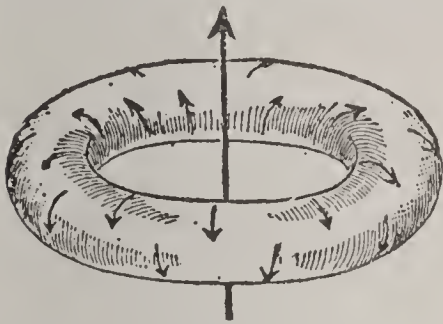


Fig. 1.

admirably adapted to display the rings. The general character of these rings or vortex-tubes is shown in the diagram (fig. 1), which indicates that, besides a progressive motion as a whole, the ring revolves about its own central or medial line. Supposing two such rings to follow one another, with their

planes parallel, and their centres moving in the same line, Helmholtz shows that (at least in a perfect fluid) the foremost will relax its speed, and spread out into a larger ring, while its follower will contract, and quicken its pace, till it passes *through* the other, which in turn becomes the pursuer, and so on. This very curious result may be realized in a tea-cup, by drawing the half-immersed bowl of a tea-spoon along the surface of the tea for a short way, and withdrawing it. Two little whirlpools or vortices are then seen moving side by side. They are sections of the half vortex ring which has been formed in the liquid by the spoon. A second half-ring may be at once sent after them by another stroke of the spoon, and the phenomenon above described will be obtained. When, on the contrary, two such vortex-rings *meet*, their centres moving in one line, they both spread out, and relax their speed indefinitely. This is obtained in a liquid by letting the half vortex-ring impinge directly on the side of the vessel, when it spreads out and relaxes its speed; just as if there were no boundary of the fluid, but a second vortex-ring occupying the place of the image of the first which would be formed by a plane mirror substituted for the side of the vessel. When one vortex-ring impinges obliquely on another, it rebounds from it, and both are thrown into vibration, their form of equilibrium being circular. They act in this respect like solid India-rubber rings. By forming them from an elliptic aperture, they are produced in a state of vibration. A square aperture gives them in a different state of vibration.

The impossibility of either producing or destroying vortex-rings in a perfect fluid—except by creative power—has led Sir W. Thomson (q.v.) to regard the ultimate parts of matter as vortices of various kinds in a perfect

VORTICELLIDÆ.

fluid: two such indestructible *vortex-atoms* are here sketched (fig. 2).

The word vortex has come into use in the Cartesian philosophy in connection with Descartes's celebrated but long ago discarded theory of the universe, given in his *Principia Philosophiæ* (see DESCARTES, RENÉ). In this the rota-

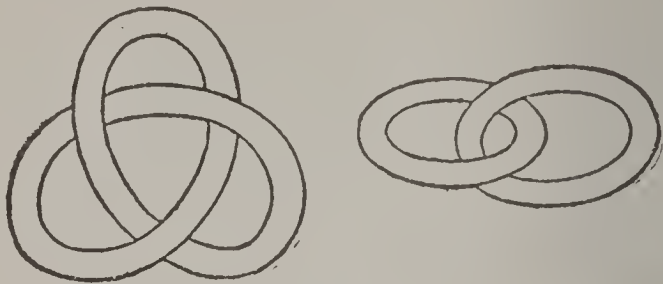
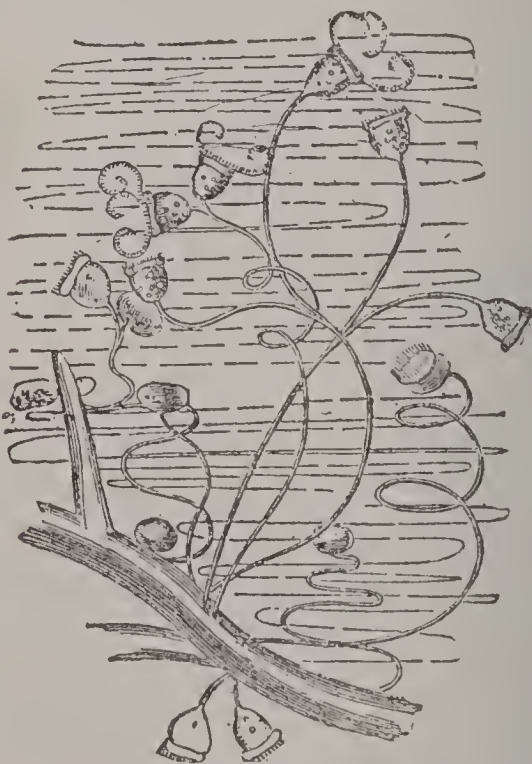


Fig. 2.

tion of the planets about the sun, the satellites about the planets, etc., was attempted to be explained by the hypothesis of vortices forever whirling about the central body. Descartes was a great mathematician; but in natural philosophy—like some recent eminent scientific men—he was betrayed into metaphysics, therein losing his scientific foothold.



Group of Bell-flower Animalcules (*Vorticella nebulifera*).
Very highly magnified.

VORTICELLIDÆ. *vawr-tī-sĕl'ī-dē*: family of *Infusoria*, remarkable for beauty, and containing a great number of species, to which, from their form, the name of *Bell* or *Bell-flower Animalcules* is often given. The genus *Vorticella* consists of minute cup-shaped or bell-shaped creatures, each placed at the top of a long flexible stalk, the other

VOSGES.

end of which is attached to some object, e.g., the stem or leaf of an aquatic plant. Around the edge of the bell or cup is a fringe of rather long cilia, the motion of which brings food to the mouth. The stem is flexible, and is sometimes stretched out to its full length, sometimes contracted in a spiral form. The contraction takes place instantaneously on any alarm, the cilia at the same time vanishing; and it is interesting to watch a group (easily done with a Coddington lens) when they adhere to the inside of the glass of an aquarium. The stem is often beautifully branched, the *Vorticella* becoming a compound animal, like many zoophytes, and the whole contracts or is extended at once. The stem, slender as it is, is a tube, through whose whole length runs a minute muscular thread. A cup or bell of a *Vorticella* sometimes develops a new fringe of cilia at its point of junction with the stem, becomes detached from the stem, and begins to move freely through the water, till it finds a new place on which to fix itself, reproduction thus taking place by gemmation. Reproduction takes place also by encapsulation: see INFUSORIA.—To the family V. belongs the genus *Stentor*, having a trumpet-shaped body, thence receiving the popular name Trumpet Animalcules. They swim freely through the water, at the same time rotating on an axis, and attach themselves to objects by a sucker at the lower or narrow end. They have a fringe of cilia round the mouth, and the body of some species is covered with cilia. They are very voracious. They may often be found adhering to a twig or the stem of an aquatic plant, looking like very minute whitish moss.

VOSGES, *vôzh*: department in n.e. France, formed 1790 out of the s. part of the old province of Lorraine; bounded n. by the depts. of Meuse and Meurthe, e. by Alsace-Lorraine; 2,260 sq. m. The portion belonging formerly to Alsace was ceded to Germany 1871. The surface is mountainous, the territory being traversed by the V. Mts. along its e. border. and by the Faucilles Mts., which cross the dept. from e. to w. The chief rivers are the Moselle and its tributaries the Meurthe, Madon, and Mortagne, all flowing n. or n.w. The mountains in the e. are covered with vast forests of beech and fir; and at the base of the mountains are tracts of pasture or rolling infertile plains. The w. part, called the *Plaine*, is very fertile in cereals, vegetables, and fruits. Among the hills the climate is cold; on the *Plaine*, humid. About 2,869,000 gallons of wine were produced 1884; average annual product of the previous ten years, nearly 4,000,000 gallons. Mineral riches abound—there being iron, lead, copper, cobalt, and antimony mines. Of the kind of cheese called *Géromé*, 23,600 cwts. are made annually. The dept. is divided into five arrondissements—Épinal, Mirecourt, Neufchâteau, Remiremont, Saint-Die. The cap. is Épinal.—Pop. of dept. (1881) 408,862; (1891) 410,196; (1901) 421,104.

VOSGES—VOSSIUS.

VOSGES MOUNTAINS (L. *Vogesus*, Ger. *Vogesen* or *Wasgau*): range of mountains in n.e. France and w. Germany, extending from s. to n., on the left bank of the Rhine, from the borders of the depts. Haute-Saône and Doubs n. to Mainz, and separating Alsace from the French depts. of Vosges and Meurthe and the German Lorraine. The range runs parallel with the Schwarzwald or Black Forest in Baden and Würtemberg, on the right bank of the Rhine, and forms the w. border of this part of the Rhine basin. The summits are rounded and regular in outline, and are called *ballons*. The chief are the Ballon de Guebwiller, 4,690 ft.; le Hobeneck, 4,482 ft.; and the Ballon d'Alsace, 4,101 ft. They are covered with forests, and abound in rock-salt, silver, copper, lead, and coal.

VOSS, *foss*, JOHANN HEINRICH: one of the foremost classical scholars of Germany: 1751, Feb. 20—1826, Mar. 29; b. Sommersdorf, in Mecklenburg; of poor parents. In 1772 he went to the Univ. of Göttingen, and there joined the 'Hainbund,' an assoc. of young poets, at the head of whom stood Bürger and Boje. V. first intended to study theology, but soon turned to Greek and Roman antiquities, under Heyne's auspices. In 1778 he went to Otterndorf, in Hadeln, where he prepared his transl. of the *Odyssey*, which appeared 1781, and received universal applause. The next year he became rector of Eutin, whence, 1789, he issued his German transl. of Virgil's *Georgics*. His contests with Heyne (q. v.) gave rise chiefly to his *Mythological Letters* (1794). Among his purely German poetical works, *Luise*, an idyl (1783, revised 1795), has foremost place. In 1799 he issued the whole of Virgil in German. In 1802 he went to Jena, where he wrote the famous review of Heyne's *Iliad*. In 1805 he was called to Heidelberg, where he wrote annotated German translations of Horace, Hesiod, Theocritus, Bion, Moschus, Tibullus, and Lygdamus. In 1821 he published a transl. of Aristophanes and a new ed. of Horace and Virgil. He with his two sons translated Shakespeare's works. In opposition to Creuzer's *Symbolik*, he wrote an *Antisymbolik* (1824), in which he lifted up his voice against exaggerated praises of heathen mysticism. V. was a strong upholder of the right of free judgment in religion, and one of his last papers was a vigorous denunciation of his former friend Stolberg, who had turned Rom. Catholic. He died at Heidelberg.—His two sons, HEINRICH V. (1779–1822) and ABRAHAM V. (d. 1847), also were known as translators.—See biographies by Paulus (1829) and by Herbst (2 vols. 1872–76).

VOSSIUS, *vōsh'ī-ūs*, GERARDUS JOHANNES (i. e., Gerard, son of John), LL.D.: classical scholar and theologian: 1577–1649, Mar. 17; b. of Dutch parents near Heidelberg, where his father (John Vos) was a Prot. minister. In 1578 the family returned to Holland, and settled at Dordrecht, where V. went to school. He distinguished himself at the Univ. of Leyden; and at the age of 22 returned to Dordrecht, to become principal of the high school. He was a most assiduous and indefatigable student. While principal of the theological college of Leyden 1614–19, he published a

VOSSIUS—VOTARY.

work on Pelagianism (*Historia Pelagiana*), in which he spoke of the Arminians in an apologetic tone, and thereby brought upon himself the wrath of the Calvinistic Dutch clergy; which caused him to be deprived of his office in the theological college. In 1622 he was appointed prof. of rhetoric and chronology, and afterward of Greek, in the Univ. of Leyden. In 1626 he was invited to England; but accepted only a prebend (from Abp. Laud) in Canterbury Cathedral, of the value of £100 per annum, without being required to live out of Holland. He was also made LL.D. of Oxford. In his book *De Historicis Latinis* (1627) he retracted at least some of his former expressions of opinion; and 1632 he was appointed prof. of history in the new univ. at Amsterdam, where he seems to have completed the great works on which his fame rests. Among the most important not mentioned above were: *Aristarchus, sive de Arte Grammatica, Libri VII.*; *De Historicis Græcis, Libri IV.*; *Commenturiorum Rhetoricorum, sive Oratoriæ Institutionum, Libri VI.*; *De Veterum Poetarum Temporibus, Libri II.*—In 1649, as he was climbing the ladder of his library, it broke; he fell under the shelves and books, and died of his injuries.

V.'s children were remarkable for beauty, accomplishments, and learning. Grotius said of him, in epigrammatic Latin, that it was doubtful whether by his books or his children he had contributed most to adorn the age. Five of his sons, Denis, Francis, Gerard, Mathew, and Isaac (q.v.), are known as authors.

VOS'SIUS, ISAAC, LL.D.: classical scholar: 1618–1689, Feb.; b. Leyden; the only son of Gerard V., who survived him. He was carefully educated by his father; and at the age of 21 he published an ed. of the *Periplus* of Scylax, the Greek geographer, with Latin transl. and notes. He afterward travelled in Italy, collecting valuable MSS. In 1648 he took up his abode at the court of Queen Christina of Sweden, whom he taught in Greek; but 1658, in consequence of a quarrel with Salmasius, he returned to Holland. In 1670 he came to England, procuring favor through his father's merits; and was made LL.D. of Oxford, and, though he had become an open scoffer at religion, he was appointed by Charles II. a canon of Windsor 1673, and had apartments assigned him in the castle, where he died. His works are numerous; and though marred by his levity and lack of judgment, some of them have been of value in ancient history, etc.

VOTARY, n. *vō'tēr-ĭ*, VO'TARIES, n. plu. [L. *votum*, a vow (see VOTE)]: one devoted, as by a vow, to some particular service, study, or state of life; one addicted to any particular pursuit. VO'TARESS, n. *-ēs*, a female votary: also in *OE.*, VO'TRESS, n. *-trēs*. VO'TARIST, n. *-ĭst*, *OE.* for VOTARY.

· VOTE ·

VOTE, n. *vôt* [F. *vote*, a vote—from L. *votum*, a thing solemnly promised—from *vovēre*, to vow; It. *voto*]: a formal expression of choice or preference in regard to any measure proposed; an expressed preference for a particular person as best fitted to fill a certain situation or office; expression of will or choice by a majority; that for which the expression of will is required, as a *vote* of confidence; that by which preference or choice is expressed; suffrage (see **SUFFRAGE**: **BALLOT**): **V.** to express will or preference, as in electing an individual to an office; to express mind or will in regard to the passing of laws or regulations; to choose or establish by vote or suffrage; to grant, approve, set aside, declare, etc., by vote, as to *vote* supplies, to *vote* the thing a success. **VO'TING**, imp. **VO'TED**, pp. **VO'TER**, n. *-tēr*, one who votes or who has a right to vote. **VO'TIVE**, a. *-tīv* [L. *votivus*, promised by a vow]: given by a vow; promised by a vow—applied to actions, offerings, observances, or the like, intended as the fulfilment of a vow, or as commemoration of the accomplishment of the prayer which accompanied the vow: see **Vow**. Of such votive engagements numerous examples are found in the Old Test. (Lev. xxii. 18; Deut. xii. 6), as well as in the ancient religions of the Gentile world; and the ecclesiastical historian Theodoret (*De Cur. Græc. Affect.*, I. 8) alludes to the practice in his day of hanging up, in the churches dedicated to the saints, little models of hands, feet, eyes, etc., in votive commemoration of the cure of lameness, blindness, and other maladies, believed to have been obtained through their intercession. The same practice still prevails in Rom. Cath. countries, especially in Italy and s. Germany; also in heathen countries generally. The offering frequently takes the form of a tablet, with an inscription detailing the event on which it is founded. Sometimes the offering is simply marked with the words *ex voto*, 'in fulfilment of vow;' sometimes it is accompanied by a model in wax, in wood-carving, or even in precious metals, similar to those alluded to by Theodoret; and occasionally by a model of some object, which is meant to recall the memory of the favor received, as of a ship in case of escape from shipwreck, etc. Many of the great churches, hospitals, monasteries, and other religious monuments of the middle ages and of later times, were built *ex voto*; and the treasures of most of the rich cathedrals and other churches in continental Europe contain objects of great value, the result of votive engagements on the part of the donors.—The epithet *votive* is also applied in the Rom. Cath. Church to the mass or other service, when it is celebrated—as is permitted on certain days and in certain seasons—not according to the rite prescribed for the day, but according to a rite selected by the celebrant himself from a number of such 'votive masses' and 'votive offices,' e.g., 'of the Passion,' 'of the Holy Trinity,' 'of the Blessed Virgin Mary,' etc., which are contained in the Missal and Breviary. **VO'TIVELY**, ad. *-lī*. **VOTING-PAPER**, a balloting-paper; a proxy.

VOTING-MACHINE.

VOTING-MACHINE: device for mechanically indicating and recording the votes. The first patent for a V. M. was granted to J. W. Rhines, of St. Paul, Minn., 1889, Mar. 4. The mechanism consists of an oblong box about 3 ft. long, 18 in. wide, and 8 in. deep. On the lid of this box are arranged keys in rows across the box to represent the offices, and in rows running lengthwise of the box to represent the entire ticket. Thus:

	1 Rep.	2 Dem.	3 Pro.	4 Labor.	5 Cit.
Governor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Secretary } of State }	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Treasurer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The keys have on them the names of the candidates plainly printed, and the party tickets are likewise indicated by color, the whole range of keys of each party being of a distinct color. Each key as pressed becomes automatically locked down and cannot be voted again, nor can any other ticket in that horizontal row. When the voter has completed his vote, he closes down an outer lid, which at once records his vote, and releases all keys in readiness for another vote; any attempt to raise the cover to repeat the vote rings a bell which calls the attention of the judges. The raising of the cover by a new voter acts as a tally of the number of votes cast, as each time that it is raised a numbering machine records the act.

On opening the machine at closing of the polls each candidate's vote is found numbered and recorded on a strip of paper, so that the entire vote can be immediately announced. The legislature of Mich. (1893) authorized the use of this machine in any municipality in the state. Other machines on similar principles have been invented and used in various localities.

VOUCH—VOW.

VOUCH, *v.* *vouch* [OF. *voucher*, in *law*, to call to defend—used by a person whose possession was attacked when calling upon another to defend his right—from L. *vocāre*, to call—from *vox* or *vōcem*, the voice]: to give one's own guarantee for the matter in dispute; to attest; to warrant; to maintain by affirmations; to bear witness; in *OE.*, to obtest: *N.* in *OE.*, favorable testimony. **VOUCH'ING**, *imp.* **VOUCHED**, *pp.* *voucht*. **VOUCHER**, *n.* *vouch'ér*, one who gives witness to anything; a paper or document which serves to attest the truth or correctness of accounts or disbursements; one who calls in another to make good his warranty of title; a voucher. **VOUCHEE**, *n.* *vouch é'*, in *law*, one called into court to make good his warranty of title. **VOUCH'OR**, *n.* *-ör*, one who calls in another to make good his warranty of title.—**SYN.** of 'vouch, *v.*: to affirm; declare; confirm; asseverate; aver; assure; protest.

VOUCHSAFE, *v.* *vouch-sāf'* [*vouch*, and *safe*]: to warrant safe; to give sanction to; to assure; to condescend to grant; to condescend; to deign. **VOUCHSA'FING**, *imp.* *-sā'fing*. **VOUCHSAFED'**, *pp.* *-sāft'*. **VOUCHSAFE'MENT**, *n.* *-sāf'měnt*, what is vouchsafed or granted in condescension.

VOUSSOIRS, *n. plu.* *vós-swawrs'* [F. *voussoirs*—from a supposed mid. L. *volutiārē*, to bend, to vault—from L. *volūtus*, *pp.* of *volvērē*, to turn]: in *arch.*, the stones which form the arch of a bridge, vault, etc., and which are cut in the form of a truncated wedge.

VOW, *n.* *vow* [F. *vœu*, a vow, a prayer—from L. *votum*; a vow, a thing solemnly promised; *vōtus*, *pp.* of *vovērē*, to vow: It. *voto*]: solemn promise made to God; solemn engagement to one's self to do something hereafter; formal promise, as of love or matrimony: *V.* to consecrate or set apart to God by solemn promise; to make a solemn promise. **VOW'ING**, *imp.* **VOWED**, *pp.* *vowd*: **ADJ.** consecrated by solemn declaration; sworn; declared. **VOW'ER**, *n.* *-ér*, one who makes a vow. **VOW-FEL'LOW**, *n.* in *OE.*, one bound by the same vow.—*Vows* appear to have formed part of the religious observance of almost all races in any degree civilized; and they pervaded the whole ceremonial system of the Mosaic dispensation (Gen. xxviii. 20; Lev. xxvii. 2; I Chron. [I Paralip. Vulg.] xxix. 9; II Chron. xxxi. 6; Judg. xi. 30; Num. xxx. 2; Judith xvi. 19; Jon. i. 16). The stringency of the obligation of fulfilling a vow, when once made, is distinctly laid down (Deut. xxiii. 21; Eccl. v. 4, 5); but it is equally clearly stated that it is not a matter of obligation to make a vow (Deut. xxiii. 22). The practice of making vows continued among the Jews in the time of Christ; and the apostle Paul, after his conversion to Christianity, continued to conform to this usage (Acts xviii. 18). Not entering here into the question whether this observance was meant by the Lord Jesus to form part of his new dispensation, or discussing how far the practice of vows, especially of chastity, can be traced as in use among the Christians of the 1st and 2d c., we may say that it is quite clear that in the end of the 3d and through the 4th c. the monastic life under vows became general in

the East, and soon afterward spread throughout the church: see ANTONY: PAUL: MONACHISM.—Vows, discarded as a religious observance by the Reformers, have a large place in the system of the Rom. Cath. Church. The objects of these engagements are very various; but they are drawn mostly from what are called the ‘Evangelical Counsels’ (q.v.), in distinction from ‘precepts’ or ‘commands’—the most ordinary subject of vows being the so-called ‘evangelical’ virtues of poverty, chastity, and obedience. Pilgrimages, acts of abstinence, or other self-mortifications, whether of the body or of the will, special prayers or religious exercises, are frequently made the object of vows: and there is another large class of more material objects, e.g., the building of churches, monasteries, hospitals, and other works of public interest or utility, to which mediæval Europe was indebted for many of its most magnificent memorials of piety and of art (see VOTIVE). Vows in the Roman Church law are either ‘simple’ or ‘solemn:’ the principal difference is in the legal effects of the ‘solemn’ vow, which, where the subject of such vow is chastity, renders not merely unlawful, but null and void, a marriage subsequently contracted. A ‘simple’ vow of chastity makes it unlawful to marry, but, except in the Jesuit Soc., does not invalidate a marriage, if subsequently contracted. Rom. Catholics acknowledge in the church a power of dispensing in vows; but this is held to be rather declaratory than remissory, and it is not acknowledged in the case of vows which involve any right of a third party. Bishops are held to possess the power of dispensing in simple vows generally; but the power of dispensing in solemn vows and in certain simple vows, e.g., that of absolute and perpetual chastity, and of the greater pilgrimages, is reserved to the pope. The practical operation of the canon law regarding vows has evidently been much modified in Rom. Cath. countries since the French Revolution, and the subsequent political changes; but this must be understood to regard chiefly their external and purely juridical effects. So far as concerns their spiritual obligation, the modern Roman theology recognizes little if any change.—See Ferraris, *Bibliotheca Canonica*; André, *Cours de Droit Canon*; Welter and Wetse’s *Kirchen-Lexicon*.

VOWEL, n. *vor’èl* [F. *voyelle*, a vowel—from L. *vocālis*, sounding, a vowel—from *vox* or *vōcem*, a voice: It. *voce*, a vowel: F. *vocal*, vocal]: a distinct simple sound uttered by the voice; in English the vowels are *a*, *e*, *i*, *o*, *u*, and sometimes *w* and *y*, each of which represents a distinct sound, thus distinguished from the consonants, which represent imperfect sounds (see LETTERS): ADJ. pertaining to or having the quality of a vowel; vocal. VOWEL-POINTS, certain marks or signs employed to indicate vowel-sounds in such languages as the Hebrew, Arabic, etc. VOW’ELLED, a. -*èld*, furnished with or having vowels. VOW’ELISM, n. -*izm*, use or frequency of vowels.

VOX—VR'IHASPATI.

VOX, n. *vöks* [L., a voice]: a voice. **VOX-ANGEL'ITA**, n. an organ-stop consisting of two ranks of pipes of small scale and delicate quality of tone, one of which is tuned slightly sharp, in order to produce a wavy and tremulous sound; called also *voix céleste*, *unda maris*, etc. **VOX-HUMA'NA**, n. one of the reed-stops in an organ intended to imitate the sounds of the human voice, consisting of a large reed and short tube; called *voce humana* in Italian, *voix humaine* in French, and also *anthropoglossa*. **VOX POPULI**, **VOX DEI**, *vöks pöp'û-lî*, *vöks dē ī* [L. phrase]: the voice of the people is the voice of God.

VOYAGE, n. *voy'āj* [F. *voyage*, a journey—from L. *viaticum*, journey money or provision; in *mid. L.*, a journey—the L. *via* becoming F. *voie*, way: Sp. *viage*; It. *viaggio*]: a passage by sea from one place or country to another; in *OE.*, travel; course; attempt: V. to pass across or over a sea to a distant place or country; to pass by water. **VOY'AGING**, imp. **VOY'AGED**, pp. *-ājđ*. **VOY'AGER**, n. *-āj-ēr*, one who passes or journeys by sea. **VOY'AGEABLE**, a. *-ā-bl*, that can be passed over or navigated. **VOYAGEUR**, n. *vōā-ā-zhēr'* [F., a traveller]: one of a class of men employed by the fur companies of Canada and Hudson Bay Territory in transporting goods to and from distant stations.

VOYAL, n. *voy'āl*, or **VOY'OL**: among *seamen*, a large rope sometimes used in weighing anchors.

VOYSEY, *voy'zî*, **CHARLES**: English theistic preacher: b. London, 1828, Mar. 18. He took the degree A.B. at Oxford 1851; was ordained priest in the Established Chh., and became curate of Hessle, near Hull; held a curacy in Jamaica 1859-61; returning to England, held in succession four curacies, and 1864 became vicar of Healaugh, Yorkshire. In the mean time he had preached against the orthodox doctrine of hell. He now began to circulate his opinions about various church dogmas through the press, and published (1864) a sermon, *Is Every Statement in the Bible about Our Heavenly Father Strictly True?* The next year he began a monthly publication, *The Sling and the Stone*. He was tried for heretical teaching and found guilty by an ecclesiastical court 1869, Dec. 1; the judicial committee of the privy council confirmed the judgment and ordered him deposed 1871, Feb. 11. V. then became minister of a 'theistic church' in London. He is author of *The Mystery of Pain, Death, and Sin*.

VRAISEMBLANCE, n. *vrā'sāng-blāngs* [F. *vrai*, true; *sembler*, to seem]: the appearance of truth; verisimilitude.

VR'IHASPATI, *vrē-hās'pa-tē*, or, as in Vedic works, **BR'IHASPATI** [from Skr. *br'ih*, probably hymn, prayer, and *pati*, protector, lord]: in Vedic mythology, the guardian of the hymns or prayers addressed by the pious to the gods: therefore considered as mainly instrumental in insuring the efficacy of the sacrifice. He is 'the first-born in the highest heaven of supreme light,' because the prayers reach him first; he is 'seven-faced,' because his faces are the seven Vedic meters; and he is 'attended by all the companies of gods,' or 'represents all gods,' when the sacrifice

VR'ITRA—VULCAN.

is performed. Being thus the 'first sharer of the offering,' he is sometimes also identified with *Agni*. His function of guardian of the hymns being similar to that of a priest and spiritual teacher, he is further represented as a priest of the gods, who himself 'celebrates worship,' and as imparting 'virtuous instruction.' In the epic and Purânîc mythology, V. figures especially as preceptor of the gods and R'ishis, as such causing them to perform sacrifices. A new character in which he appears at that period is that of regent of the planet Jupiter; and in the ceremonies in honor of the planets special worship is paid him in this capacity.

VR'ITRA: see INDRA.

VUGH, or VUGG, n. *vóg* [prov. F. *vorg*, a variant of *D. vide*, void, empty (see VOID)]: in *mining*, a cavity or vacant space in a lode or metalliferous vein. VUGHY, a. *vûg'i*, empty; hollow.

VULCAN, *vûl'kan* [name probably connected with *fulgere* and *fulgur*, thence the 'bright or shining one;' comp. Skr. *ulka*, firebrand]: the old Italian god of fire. The various myths in connection with V. prove the great antiquity of his worship. Latterly the character, attributes, and history of the Greek Hephæstus were transferred to V., and the two thus became identified. According to Homer, Hephæstus was the son of Zeus and Hera; later accounts, however, asserting that the latter gave birth to him without co operation of her husband. He appears to have been twice violently expelled from Olympus—the first occasion shortly after his birth, when he was dropped on the earth by his mother, who was disgusted with his sickly deformity; he was received by the marine divinities Thetis and Euronyme, with whom he dwelt for nine years. He afterward returned to Heaven, and, interfering in a quarrel between his mother and Zeus, the latter seized him by the leg, and flung him from Olympus. After falling for a whole day, he alighted on Lemnos, where he was kindly received by the Sintians. He afterward returned to Olympus. Homer makes him lame from his birth: later writers attribute this defect to his second fall on Lemnos. The popular notion of V. or Hephæstus appears to have been that of a burly, lame, good-natured, awkward god, often the butt and laughing-stock of his fellows. He had a magnificent palace in Olympus, 'immortal, brazen, shining like stars,' in which was his workshop, containing an anvil and 20 bellows, which worked at his command. Later accounts locate his workshop in the interior of some volcanic isle, such as Lemnos, Lipara, Sicily, etc., and give him as workmen the Cyclopes, Brontes, Steropes, etc. Many wonderful works of art are ascribed to V. by the ancient poets; and as an artist or artificer he appears to have been regarded as corresponding in some respects to Athene: both instructed men in the useful and ornamental arts, had the power of healing, etc., and at Athens had temples and festivals in common. In the *Iliad* the wife of Hephæstus is Charis; while in the

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Odyssey, and in later writers, he is represented as being tormented by the amours of his frail and charming spouse Aphrodite with her favorite Ares (Mars). In the earlier statues his lameness appears to have been indicated; but latterly he was represented as a full-grown, vigorous man with a beard.

VULCAN, supposititious infra-Mercurial planet. The hypothesis of V., or of a planet revolving in an orbit between Mercury and the sun, was put forth by the French astronomer Leverrier (q.v.) 1859: he inferred the existence of a planet between Mercury and the central orb from a movement of Mercury's perihelion that could not be accounted for on any other hypothesis. Another French astronomer, Dr. Lescarbault, asserted that 1858, Mar. 25 (6 months before Leverrier's hypothesis was published), he had seen the supposititious planet crossing the sun's disk. A similar observation was supposed to be made by two astronomers in the Paris observatory during the time when—according to the hypothesis—its transit was due, 1876, Oct.; but observers elsewhere did not see it then, nor has it been seen since; and the existence of V. is now regarded as practically disproved by the negative results of subsequent observations.

VULCANIAN, a. *vŭl-kā'nī-ăn* [L. *Vulcānus*, in *anc. myth.*, the god of fire]: pertaining to Vulcan (q.v.); relating to volcanoes; volcanic; relating to the theory of the vulcanists. **VULCANIZE**, v. *vŭl'kăn-īz*, to change the properties of India-rubber by causing it to combine with sulphur and white lead by the agency of heat. **VULCANIZING**, imp. **VULCANIZED**, pp. *-īzd*. **VULCANIZA'TION**, n. *-ī-zŭ'shŭn*, the art or process of changing the properties of India-rubber by combining it with sulphur and white lead by means of heat. **VULCANISM**, n. *-īzm*, or **VULCANIC'ITY**, n. *-īs'ī-tŭ*, the thermal phenomena, ascribed to the constantly active reaction of the interior of the earth upon its external crust or surface. **VULCANIST**, n. *-īst*, one who contends that igneous action was present in the formation and modification of the earth's crust. **VULCANITE**, n. *-īt*, volcanic garnet, so called from its occurrence in ejected blocks and lavas: India-rubber hardened by vulcanization (see **CAOUTCHOUC**). **VULCANOL'OGY**, n. *-ŏl'ŏ-jŭ*, the department of physical science which relates to volcanoes and other igneous action on the earth's surface. **VULCANOL'OGIST**, n. *-jŭst*, one who studies vulcanology.

VULCANO, *vŏl-kā'nŏ*, or **VOLCA'NO**, *vŏl*: most southern of the Lipari Islands (q.v.), in the Mediterranean, 12 m. from the n. coast of Sicily; about 7 m. long and 3 m. wide. Near the centre is a crater one-fourth of a m. in circumference, which constantly emits smoke and vapors. The highest point of this crater, which is also the highest point of the island, is 1,601 ft. Only the s. part of the island is fertile. The products are grapes, wine, fruit, corn, and flax.

VULGAR—VULGATE.

VULGAR, a. *vŭl'gēr* [F. *vul'gère*—from L. *vulgāris*, be-
 longing to the great mass or multitude, general—from
vul'gus, the multitude: It. *vul'gare*]: common; vernacular,
 as in the *vulgar* tongue; offensively mean or low; rude;
 unrefined; in *OE.*, public; common only rumored; consisting
 of common people: N. the common people; in *OE.*, a
 vulgar or common person; the common language. **VUL'**
GARLY, ad. *-lŭ*. **VULGARITY**, n. *vŭl-gār'ŭ-tŭ*, coarseness or
 clownishness of manners or language; mean or gross mode;
 absence of refinement and good taste; rudeness of manners.
VUL'GARIZE, v. *-gēr-īz*, to make vulgar. **VUL'GARIZING**
 imp. *-ī-zing*. **VUL'GARIZED**, pp. *-īzd*. **VUL'GARISM**, n.
-izm, coarseness; vulgarity; a vulgar phrase or expression.
VULGA'RIAN, n. *-gār'ŭ-ān*, one who indulges in vulgarisms
 or in vulgar ideas. **VULGAR FRACTIONS**, fractions written
 in the usual or common manner, as distinguished from
decimal fractions.

VULGATE, n. *vŭl'gāt* [F. *vulgate*—from mid. L. *vul-*
gāta, the Vulgate—from L. *vulgātus*, pp. of *vulgārē*, to
 publish—from *vul'gus*, the multitude]: the Latin version
 of the Scriptures used in the Rom. Cath. Chh. service: **ADJ.**
 pert. to or contained in the Vulgate.—The *Vulgate* is the
 received version in the Rom. Cath. Church. It must not
 be confounded with the older Latin translation known as
 the *Itala* (see **ITALIC VERSION**, under **ITALIAN**). While
 Jerome was correcting the *Itala*, he conceived the plan of
 producing a completely new version of the Old Test.,
 from the Hebrew text itself. He began this labor about
 385 and completed it 405. He also made an improved
 version of the Italic New Test., and the two together
 received the name *V.* The discrepancies between the *V.*
 and the *Itala*, which had been made from the *LXX.*, were
 so numerous and important that the charge of heresy and
 falsification of Scripture was openly preferred against the
 translator by Rufinus, and even St. Augustine was doubt-
 ful for some time whether this charge might not be true.
 But gradually the *V.* made its way in the church, first in
 Gaul, then in Rome—chiefly through Gregory the Great
 —and finally throughout the West. About 200 years after
 Jerome's death (he d. 420), it became the universally re-
 ceived version of the church. In 802, however, the text
 of the *V.* had become so corrupted that Charlemagne
 commissioned Alcuin to revise it by old MSS., and to
 compare it with the original texts. This revision, to which
 afterward came other 'emendations,' in the 11th and 12th c.
 (by Lanfranc, Abp. of Canterbury, and Cardinal Nicolaus
 respectively), completely changed the original character
 of the work. Nor did the 'Correctoria Biblica' (i.e., cer-
 tain collections of commentated and revised texts, issued
 at the period) do much for improvement of the corrupted
 MSS. The confusion between the different codices was
 chiefly remarked when the Tridentine Council, 1546, first
 declared the *V.* the authorized version of the Roman
 Church, and decreed the preparation of an authenticated
 edition. In 1564 the papal chair undertook the task;
 but not before 1590 did Sixtus V. produce the work.

VULNED—VULTURE.

This, however, turned out to be so utterly incorrect and faulty that the copies were speedily suppressed; and another edition, which appeared 1592, was prepared under Clement VIII., to which (1593) that other edition succeeded which has since remained the normal edition of the Church of Rome, and has been reprinted unchanged ever since. The Anglo-Saxon translation of the Pentateuch and Joshua, by Aelfric (10th c.), was made from the V., and not, as has been erroneously supposed, from the Septuagint. The V. has been repeatedly translated into Arabic (the Psalms even into Persian) for the use of the Rom. Catholics in the East.

VULNED, *vŭl'nĕd*: in *heraldry*, wounded—e.g., a human heart, wounded, and with the blood dropping from it.

VULNERABLE, a. *vŭl'nĕr-ă-bl* [F. *vulnérable*—from L. *vulnerāre*, to wound—from *vulnus*, a wound]: that may be wounded; liable to injury. **VUL'NERABIL'ITY**, n. *-bĭl'ĭ-tĭ*, quality of being vulnerable or liable to injury; also **VUL'NERABLENESS**, n. *-bl-nĕs*. **VUL'NERARY**, a. *-ĕr-ĭ*, useful in healing wounds: N. any plant or drug which is useful in healing wounds. **VUL'NERA'TION**, n. *-ă'shŭn*, in *OE.*, the act of wounding. **VUL'NEROSE**, a. *-ōs*, covered with wounds.

VULPINE, a. *vŭl'pĭn* [L. *vulpinus*, belonging to a fox—from *vulpēs*, a fox: It. *volpino*]: pertaining to or resembling the fox; cunning; artful. **VUL'PICIDE**, n. *-pĭ-sĭd* [L. *vulpēs*, a fox, and *caġo*, I kill]: one who kills foxes as vermin instead of preserving them for hunting; the killing of foxes.

VULPINITE, n. *vŭl'pĭn-ĭt* [from *Vulpino*, in Italy]: a granular variety of gypsum which takes a fine polish and is used for ornamental purposes.

VULTURE, n. *vŭl'tŭr* or *-chŭr* [L. *vultur*, a vulture—probably from *vello*, I pluck or tear]: large rapacious bird of prey of the family *Vulturidæ*. **VUL'TURINE**, a. *-ĭn*, pert. to or resembling the vulture. **VUL'TURISH**, a. *-ĭsh*, like a vulture; rapacious; also **VUL'TUROUS**, a. *-ŭs*.—The *Vultures* (*Vulturidæ*) of the old world have a longer beak than the *Falcons* (*Falconidæ*), and it is straight at the base, slightly or not at all toothed, the upper mandible longer than the lower, and hooked at the tip: the head is generally bare, or covered only with a short down, which in most of the species is the case also with the neck—a ruff or collar of soft feathers surrounding the lower part of the neck, into which the upper part, and even most of the head, can be withdrawn. The legs and feet are large; but the claws are not nearly so large and strong as in the *Falconidæ*, and are but slightly hooked. The middle toe is very long. The wings are long, and their expanse consequently great. Vultures have great powers of flight, and many of them soar to a very great height. Their plumage has not the neat and regular appearance of that of the *Falconidæ*, but it is dense, and not easily penetrated by shot. Vultures are found mostly in warm climates.

VULTURE.

and many are inhabitants of mountainous regions. They feed on carrion, which it seems to be their office in nature to remove from the face of the earth, that the evil consequences of its corruption may be prevented. They seldom attack a living animal; but they have been seen to sit and watch the approach of death, waiting for their feast; and great numbers have been seen on battle-fields, assembled to devour the dead. They are not in general courageous, and are often put to flight by much smaller birds; yet, if unmolested, they readily become familiar with the presence of man, and some of them seek their food even in the streets of towns, in which they are useful as scavengers. They gorge themselves excessively when food is abundant, till their crop forms a great projection, and sit long in a sleepy or half-torpid state to digest their food. They do not carry food to their young in their claws, but disgorge it for them from the crop. The bareness of their head and neck adapts them for feeding on putrid flesh, by which feathers would be defiled; and they are very careful to wash and cleanse their plumage. The question has been much discussed whether vultures discern dead animals by the eye, or are attracted to them by the smell. It is certain that they possess great powers both of smell and of vision, and the reasonable conclusion appears to be that both are of service in directing them to their prey.

The *Vulturidæ* are divided into several genera, of which one, *Gypætos*, approaches to the *Falconidæ* in characters and habits, having the head feathered, and feeding not always on carrion, but often attacking living animals: the Lämmergeier (q.v.) is one of this group. The feet are feathered to the toes, while the other vultures have the tarsi bare.

Some notable species of V. are described under their respective titles (see EGYPTIAN VULTURE: ETC.). The generic name *Vultur* is now restricted to those which have the head and neck without feathers and without caruncles, and a ruff of long feathers or of down at the lower part of the neck. To this genus belongs the TAWNY V., or GRIFFON (*V. fulvus*), found in s. Europe, n. Africa, and w. Asia. It makes its nest on the most inaccessible rocks of high mountains, as in the Alps and Pyrenees, and sometimes in tall forest-trees. It is a very large bird, more than four ft. in length. Its plumage is yellowish brown, the quills and tail-feathers blackish brown, the down of the head and neck white, the ruff white. When it has found a carcass on which to feed, it remains on the spot, gorging and torpidly resting by turns, till no morsel remains. This V. has been seen in England, but only as an accidental visitor. The mountains and forests of s. Europe, as well as of n. Africa and great part of Asia, are inhabited also by the CINEREOUS V. (*Vultur* or *Gyps cinereus*), another large species, which departs from the typical character of the vultures in having the greater part of the neck feathered, and comparatively large and powerful claws: it does not attack living animals. India, Africa, and almost all warm countries abound in vultures of different species.

VULVA—VYĀSA.

The New World Vultures, so called, are quite distinct and form the family *Cathartidæ*. Their habits and feeding are like the true vultures of the old world, but they have less of the falcon element, approach mostly the gallinaceous character (the Turkey Buzzard even resembling its namesake), and are weak and given to a hopping mode of progression when on their feet, though powerful in long and high flight. The Condor (q.v.) of S. America is the grandest example. In the southern states of N. America is found the BLACK V. (*Cathartes atratus*), there generally known as the CARRION CROW, a comparatively small species, not quite 2 ft. in entire length, of deep black color, head and neck covered with warty excrescences and a few hair-like feathers. This bird is very abundant also in many parts of S. America, where it is called the GALLINAZO. Very nearly allied to it, and found in the same regions, is the TURKEY BUZZARD, or RED-HEADED V. (*Cathartes aura*). These vultures are more or less gregarious, not only assembling where food is to be found, but flying in flocks. They make their nests in hollow trees, and sometimes in the chimneys of deserted houses, or on the roofs of houses. In some towns of tropical America they may be seen in great numbers, perched during the heat of the day on the tops of houses or on walls, asleep, with their heads under their wings. The CALIFORNIAN V. (*Cathartes Californianus*) is the largest of this family in N. America, being fully 4 ft. long, and about 9 ft. in extent of wings: it is black, with a white band on the wings; found among and w. of the Rocky Mts. In habits it resembles the condor.

VULVA, n. *vũl'va* [L. *vulva* or *volva*, wrapper or integument]: in *anat.* and *zool.*, an entrance or opening. VULVIFORM, a. *-favorm* [L. *forma*, shape]: in *bot.*, like a cleft with projecting edges.

VYĀSA: legendary personage, reputed arranger of the Vedas (q.v.), and reputed author of the Mahābhārata (q.v.), the Purān'as (q.v.), the Brahmasūtras (see VEDĀNTA), and of a Dharmas'āstra: according to tradition, son of the sage Parās'ara and Satyavatî, 'the truthful,' who was a daughter of King Vasu and a heavenly nymph, Adrikâ. That the immense bulk of literature comprised by the above-named works, and relating to different periods, cannot belong to the authorship of one and the same personage, is beyond doubt. But the name itself indicates the meaning of its connected legends: it signifies 'arranger,' 'distributer.' Vyāsa is, therefore, a symbolical personification of the work of generations, as embodied in the Vedas, the Mahābhārata, and the Purān'as, and of the order which gradually was brought into this literary mass: thus the Vishn'u-Purān'a speaks of 28 Vyāsas who in the reign of the present Manu arranged the Vedas. Regarding the Brahmasūtras, tradition itself seems only loosely to connect their author with the Vyāsa of the foregoing works. (See Colebrooke's *Miscellaneous Essays*, I., 327, Lond. 1837.)

VYATKA—VYING.

VYATKA, or **VIATKA**, *vě-âi'kâ*: government in e. European Russia; bounded e. by the govts. of Perm and Orenburg, s. by that of Kazan; 59,124 sq. m. The surface consists mostly of marshes and sandy plains, with some hills. The soil, fertile only in the s. districts, is mostly a mixture of sand and clay. In the s., agriculture is effectively carried on; wheat, rye, barley, and oats being produced in abundance, as well as flax and hemp for the linen manufactures. The principal rivers are the Vyatka and Kama (navigable throughout the year), and their affluents. The number of navigable streams, and the well-regulated land-communications, give facilities for traffic. There are no railways, but the great Siberian highway passes through the province. Horses of fine breed are reared, but the principal source of wealth is timber. Iron-works, distilleries, tanneries, and glass and cotton factories are in operation. V. is divided into 11 districts, of which *Vyatka* and *Izhevsk* are the most important.—Pop. (1861) 2,170,221; (1883) 2,859,000; (1897) 3,082,788.

VYAT'KA, or **VIAT'KA**: town of Russia, cap. of the govt. of V.; on the river Vyatka; 280 m. n.e. of Niini Novgorod, 653 m. n.e. of Moscow. It was founded by the inhabitants of Novgorod 1181; and was annexed to the Muscovite dukedom 1489. Until 1780 it was called Khtynoff. The chief industries are preparation of skins and manufacture of tallow and wax candles. Grain is exported annually to the value of 300,000 roubles (about \$230,000).—Pop. about 25,000.

VYAZMA, or **VIAZMA**, *vě-âz'mâ*: town of Great Russia, govt. of Smolensk; on the Vyazma; 109 m. e.n.e. of the town of Smolensk. It is mentioned first 1239, and, after being controlled successively by the Lithuanians and Poles, it finally became Russian 1634. In 1812, after a bloody battle between the Russian and French armies, in which the former was victorious, V. was demolished, and there are now hardly any remains of the old town. V. has been rebuilt, and has active trade in grain, flax, hemp-seed, tallow, etc.; and is the entrepôt for goods exported to St. Petersburg and Riga. V. ginger-bread is exported to all parts of the empire. Pop. about 13,000.

VYING, v. *vī'ing* [see **VIE**]: competing.

W

W, or w, dŭb'l-ŭ: 23d letter of the English alphabet, and a consonant, named from its printed character representing a double V, V being the Roman form of our U. W performs the double office of a consonant and a vowel; it is a consonant when commencing a word or syllable, as *win*, *Waverley*, and a vowel at the end of a word or syllable, but only when preceded by a vowel, as *paw*, *now*, *grew*, thus forming the latter element of a diphthongal sound. According to the experiments of Prof. Willis (*Cambridge Phil. Trans.*, III. 231), the natural order of the vowels is *i, e, a, o, u*, or the reverse; in which the sounds must be understood to be those which prevail on the continent of Europe. The sounds, then, of *i* (that is, *ee*) and *u* (that is, *oo*) are the most remote, and the attempt to pass with rapidity from either of these to the others, particularly to the other extreme, gives an initial breathing which has the character of a consonant—viz., in one case, *ee-oo*, or *you*; in the other, *oo-ee*, or *we*: see Key's *Alphabet*. This acute analysis of the articulations denoted by the characters *w* and *y* throws a clear light on their double function as consonants and as vowels. The letter *w*, which originated in the middle ages, is merely one *v* joined to another, as its English name imports. It is peculiar to the English, German, and Dutch alphabets. It appears, from a variety of phenomena in Latin and Greek, that the L. *v* or *u*, used as a consonant, as well as the old Greek digamma (F), were more of the nature of the modern *w* than of the decidedly consonantal English *v* (see U and V). The French, having, like the other Romanic nations, no character *w*, express the sound by prefixing *ou* to the vowel—as *oui* (pron. *wee*), *Edouard* = *Edward*. In the beginning of proper names they substitute *gu*, e.g., *Guillaume* = *William*. The Spaniards also use *gu*, as in the many names compounded of the Arabic *wadī*, e.g., *Guadalquivir*; but more frequently *hu*, as in *Chihuahua* (pron. *Chiwawa*). In High German, which has become classical German, *w* is confounded with *v*, and *v* with *f*; thus, *Wellington* is pronounced *Vellington*. Among the lower classes in London *w* is substituted for *v*, and *v* for *w*, with 'a most amusing perversity:' compare the utterances of Sam Weller and his father in Dickens's *Pickwick Papers*.—In *chem.* W is the symbol for *tungsten* (L. *Wolf-ramium*). As an abbreviation W stands for *west*, *western*, *westerly*, *William*, *Wednesday*, *Welsh*, etc.

WAAL, vāl, THE (L. *Valis* or *Vahalīs*): arm of the Rhine; thrown off near the village of Pannerden, in the Netherlands, flowing thence to Nijmegen, Tiel, Nieuw-St.

WABASH—WACE.

Andries, between the Roemmeler- and Tieler-waard, and uniting with the Maas below Fort Loevestein (Luvestein). The united rivers there take the name Merwede, which, flowing past Gorinchem and Dordrecht, becomes the Oude, or Old Maas: see MAAS.

WABASH, *waw'bāsh*: river of the United States; rising in w. Ohio, flowing w. and s.w. through Ind., forming the s. half of the boundary-line between Ill. and Ind., and joining the Ohio river at a point 146 m. from its mouth. The W. is 550 m. long, and at high water is navigable by steamers for 300 m. Its principal branches are the Tippecanoe, Big Vermilion, Embarras, and White river—the last 200 m. long. The Wabash and Erie canal connects the lakes with the Mississippi.

WABASH, *waw'bāsh*: city, cap. of Wabash co., Ind.; on the Wabash river, and on the Cincinnati Wabash and Michigan, the Lake Erie and Western, and the Wabash railroads; 30 m. e. of Logansport, 42 m. w.s.w. of Fort Wayne. It is in an agricultural region; has a court-house, 8 churches, excellent high school, female acad., shops of the Cincinnati Wabash and Michigan railroad, 3 national banks (cap. \$292,875), 1 private bank, 2 daily and 3 weekly newspapers; manufactures woolen goods, flour, oil, furniture, machinery and carriages. Pop. (1880) 3,800; (1890) 5,105; (1900) 8,618.

WABBLE, *v.* *wōb'bl* [see also **QUAVER**: *Bav. waiβeln*, to stagger, to totter: Low Ger. *wabbeln*, *quabbeln*, to shake like jelly or boggy ground]: to sway to and fro; to incline unsteadily from one side to the other, as a spinning top that is about to fall, or the like; to move staggeringly from one side to the other: *N.* a swaying or staggering to and fro. **WAB'BLING**, *imp.* *-bling*: **ADJ.** having an irregular motion from side to side. **WABBLED**, *pp.* *wōb'bld*. **WABBLY**, or **WOBBLY**, *a.* *wōb'blī*, inclined to wobble; unsteady.

WACE, *vās*, **ROBERT** (?): Anglo-Norman poet: b. in the island of Jersey, about 1120; d. in England about 1180, certainly before 1184. Many different versions of his name are given in his own books and in others which mention him. He is styled Vace, Wace, Waece, Waice, Waicce, Waze; Gasse, Gaice, Guace, Guazi, Guaze, Guascoe, Gazoe; and, again, Wistace, Huistace, Huace. It has been supposed that there were really two poets, one named Wace or Guace, the other named Wuistace; one the author of *Le Roman du Rou*, the other of *Le Roman du Brut*. But variety in writing names was very common in the middle ages, and this supposition seems quite unnecessary. About his Christian name there is even more doubt than about his surname: it is never mentioned in his poems—the source of the little known about him. An old writer speaks of him as Matthew; and he was called Robert first in the *Origines de Caen* by Huet.

W. was taken to Caen as a child, and there received his early education. He was afterward sent into the neighboring kingdom of France; but he returned to Caen, and, having entered into holy orders, became a reading-clerk in

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the Royal Chapel there. It was at Caen that he composed his works. Henry II., to whom he dedicated *Le Roman du Rou*, gave him a canonry at Bayeux, apparently about 1160.

Five separate works are attributed to W.; but three are slight performances, and it is necessary to notice only two—*Le Roman du Brut d'Angleterre* and *Le Roman du Rou*, the former entirely and the latter partly in octosyllabic couplets. The former premises that a certain Brutus, son of Ascanius and grandson of Æneas, settled in Britain and became its first king. The book continues the history of the Brit. kings from Brutus to Cadwallader, who died at Rome shortly before 700. It is little more, however, than a literal translation into the French from the Latin of Geoffrey of Monmouth (q.v.). This poem seems to have been completed 1155. *Le Roman du Rou* (Rollo) is a sort of history of the Dukes of Normandy and of the Norman monarchy in England. Neither of these works has the slightest poetical merit. They are interesting only as showing the state of the French language in the 12th c., and as supplying occasional facts and social traits to the historian.

WACHUSETT, *waw-chô'sèt*, MOUNTAIN: near the village of Princeton, Worcester co., Mass.; 16 m. n.w. of Worcester, 8 m. s.w. of Fitchburg; 2,016 ft. above sea-level. It commands a fine and extensive view, and has many summer visitors.

WACKE, n. *wăk'ě* [Ger.]: German miner's term for a soft earthy variety of trap-rock of grayish-green color, resembling indurated clay, and readily crumbling down when exposed to the weather; a sedimentary rock of basaltic or trap material. It is often vesicular, and when the cavities are filled it becomes an amygdaloid.

WACO, *wă'kô*: city, cap. of McLennan co., Tex.; on the Brazos river, and on the Houston and Texas Central, the Missouri Kansas and Texas, and the St. Louis Arkansas and Texas railroads; 95 m. n.e. of Austin, 250 m. n.-by-w. of Galveston. It is in an agricultural, stock-raising, and wool-growing region, and has important manufactures. It contains Paul Quinn College, Baylor Univ. (Bapt.), Waco Female College, court-house, 34 churches, 3 nat. banks (cap. \$700,000), 3 state banks (cap. \$255,000); and 2 daily, 4 weekly and 5 monthly publications. The assessed valuations 1890 were \$8,337,951; receipts in fiscal year \$346,814; expenditures \$220,926; value of city property \$361,113; total valuation (1900) \$10,917,194; net debt \$596,397. W. is the shipping-point of several counties which export cotton, wheat, maize, oats and live-stock. Pop. (1880) 7,295; (1890) 14,445; (1900) 20,686.

WAD, v. *wăd*: Scot. for WOULD.

WAD, n. *wăd* [AS. *wed*; Goth. *wadi*; Icel. *ved*, a pledge (see also WED)]: in Scot., a pledge: V. in Scot., to pledge or wager. WADSET, or WADSETT, n. *wăd'sèt* [Icel. *vedsetja*, to pledge, to pawn]: a pledge; formerly, in Scots law, a legal deed in which a debtor empowers his creditor to uplift the rents of his estate till the debt be satisfied—nearly equal in

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meaning to Mortgage (q.v.): the modern name is *Bond and Disposition in Security*. WAD'SETTER, n. -sèt-tér, one having his authority from a wadset; a kind of mortgagee.

WAD, n. *wōd*, or WAD'DING, n. -dīng [Ger. *watte*; Sw *vadd*, wadding; Ger. *wat*, cloth; AS. *wæd*, a garment]: a bundle or bunch of something soft; soft stuff, of a loose texture, as cotton, wool, etc., used in stuffing and lining garments; a wisp of straw; a piece of cloth, paper, leather, or tow, rammed into a gun on top of the powder or bullet, to keep the charge in place. WAD, v. to line with a soft substance; to ram a wad into; to make into wad. WAD, n. name given in Cumberland, England, to black-lead, a mineral found in detached lumps and not in veins. WAD, or WADD, n. *wōd*, a miner's term for an earthy oxide of manganese occurring in beds and incrusting veins and fissures in the older rocks. To WAD A GARMENT, to line it with flocks of cotton compacted together. WAD'DING, n. a material for wads; sheets of carded cotton for stuffing and lining garments, etc.

WADAI, *wâ-dî'*: Mohammedan kingdom in e. Sudan (see SUDAN); e. long. 18° 30'—about 22°, and n. lat. 9°—17°. On the n. it touches the Sahara, on the e. the Egyptian province Darfur, on the s. Bagirmi and other negro states. It is a powerful state, and claims exclusive ivory and slave-hunting rights in the basin of the upper Shari. In the n. the country is arid; but in the middle and on the e., in which are the sources of the rivers Batha and Betheca and Bahr-es-Salamat, the soil is fertile. Cap. Abeshir, on the Batha. The productions are maize, durra, cotton, indigo. Area 172,000 sq. m. Pop. est. 2,600,000.

WADDEL, *wâd-dēl'*, JAMES, D.D.: Presb. clergyman: 1739, July—1805, Sep. 17; b. Newry, Ireland. With his parents he settled in Penn. while yet a child. W. was educated in Nottingham. Penn.; was licensed to preach 1761; and removing to Va. was pastor of Presb. churches 1762–75; and then became a planter in Louisa co., Va., and conducted a classical school, preaching on occasion. Two years later he became blind, but continued and even multiplied his labors. His fame as a preacher was great and widespread, as appears from William Wirt's sketch of the man and his manner in *The British Spy*. Pres. Madison declared that W. 'spoiled him for other preaching.' Patrick Henry named him as one of the two greatest orators he had ever heard.

WADDELL', JAMES IREDELL: naval officer: 1824–86, Mar. 15; b. Pittsboro, N. C. He entered the U. S. navy as midshipman 1841. While on the China station 1861 he resigned his commission as lieut., and on arrival in New York 1862, Jan., refused the command of a bomb-fleet destined for the attack of New Orleans. W. then made his way across the military cordon to Richmond, and was commissioned lieut. in the Confederate navy. He commanded the Confederate ram *Louisiana* at New Orleans, and under orders blew the vessel up after Farragut had dispersed the Confederate fleet. He was ordered to the

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Confederate cruiser *Shenandoah*, fitting out at Liverpool, and sailed as her commander 1864, Oct. 5; and preyed on U. S. vessels in the s. and n. Pacific, sinking and burning them till 1865, Aug. 2, when he first received intelligence of the surrender of Gen. Lee three months previous. The *Shenandoah* captured 38 vessels, of which she destroyed 32, many of them whaling-ships.

WADDING, *wăd dĭng*, LUKE: annalist: 1588, Oct. 16—1657, Nov. 18; b. Waterford, Ireland. He studied some time in the Jesuit college in Lisbon, Portugal; then entered the order of Franciscans 1605. Soon after his ordination as priest he became prof. of theol. at Salamanca; 1618 accompanied the bp. of Cartagena to Rome, on a mission to determine the controversy regarding the immaculate conception of the Virgin Mary, and wrote a history of the negotiations. He was procurator-gen. of his order at Rome 1630–34, vice-commissary 1645–48; founded the College of St. Isidore at Rome, for education of Irish Franciscans, 1625. He was one of the consulters in the case of Jansenius, and favored the Jansenist opinions at first, but retracted when they were condemned by the pope. He pub. (1647–54) 8 folio vols. of *Annales Ordinis Minorum*. He was also author of *Scriptores Ordinis Minorum*, and edited (in 12 folio vols.) the writings of Duns Scotus.

WADDINGTON, *wăd dĭng-ton*, WILLIAM HENRY: 1826, Dec. 11—1894, Jan. 13: statesman: b. Paris, of English parents, naturalized in France. He was educated in the Lycée St. Louis, Paris; and at Rugby School and Cambridge Univ., England; graduating at Cambridge 1849. Returning to France, he applied himself first to antiquarian studies, and travelled widely in pursuit of memorials of antiquity in Syria, Cyprus, Asia Minor, Germany, and England. He became a member of the national assembly for the dept. of Aisne 1871, and joined the left centre. He was minister of public instruction for a few days 1873, but went out of office with Thiers; was senator for the dept. of Aisne 1876–85, and then was re-elected for a term of 9 years; was again minister of public instruction 1876–7; then, 1877, Dec., minister of foreign affairs; represented France in the Congress of Berlin 1878; resigned from the foreign office 1879, Dec.; became ambassador to the Eng. court 1883, July; and held the office till 1893. He has published *Voyage en Asie Mineure*; *L'Édit de Dioclétien*; *Fastes des Provinces Asiatiques de l'Empire Romain*; and a continuation of Lebas's *Voyage Archéologique en Grèce et en Asie Mineure*.

WADDLE, *v. wăd dĭ* [a frequentative of WADE]: to move from side to side in walking, as a duck or a very fat person. WAD'DLING, imp. *-dĭng*. WAD'DLINGLY, ad. *-lĭ*. WADDLED, pp. *wăd dĭd*. WAD'DLER, n. *-dlĕr*, one who waddles.

WADE, *v. wăd* [AS. *wadan*, to wade, to trudge: Dut. *waden*; Dan. *vade*; Icel. *vada*, to wade: Ger. *wat*, a ford allied to L. *vadum*, a ford, a shallow; *vadĕrĕ*, to go]: to walk or pass through water, deep mud, or any substance which impedes free motion; to accomplish with difficulty.

WADE—WADHAM COLLEGE.

or labor. WA'DING, imp. WA'DED, pp. WA'DER, n. -der, one who wades; one of the Grallæ (q.v.) or wading birds.

WADE, *wād*, BENJAMIN FRANKLIN: U. S. senator: 1800, Oct. 27—1878, Mar. 2; b. Feeding Hills, near Springfield, Mass.; son of James W., revolutionary soldier; descendant of a colonist who came from England 1632. W. settled with his parents in Andover, O., 1821; was school-teacher in Albany, N. Y., 1823-25, at the same time studying medicine; then returning to his home, he studied law and began practice in Jefferson, O., 1827. He was prosecuting atty. of Ashtabula co. 1835-37; member of the O. senate 1837-39. His opposition to the surrender to the state of Ky. of certain fugitive slaves, worked his defeat as a candidate for re-election; but he was successful 1841. He was elected judge 1847; and 1851, Mar. 15, was chosen U. S. senator, and was member of the senate continuously till 1869. From the first he was a prominent leader of the small band of anti-slavery men in the senate. W. advocated the Homestead Bill and the repeal of the Fugitive Slave Act; he resolutely opposed the admission of Kansas under the Lecompton constitution, and the purchase of Cuba. After Preston Smith Brooks's assault on Charles Sumner, 1856, May 20, and Robert Toombs's expressed approval of the act, W. in a fiery speech challenged every pro-slavery senator in the chamber to combat: the gage was not taken up. Then W. formed a compact with Senators Simon Cameron and Zachariah Chandler to challenge any southerner who should insult them. During the civil war, W. advocated every measure that tended to weaken the enemy and to strengthen the Federal arms, as the bills for confiscation of all property of rebels in arms, abolition of slavery, etc. He was the chief leader of the republican senators in the impeachment of Pres. Andrew Johnson. W. severely censured Pres. Hayes's moderate course in dealing with the southern states. He served on the San Domingo commission of 1871. He was a man of independent thought, positive convictions, dauntless courage, and forcible expression.—His son, JAMES FRANKLIN W., was 1st lieut. 6th U. S. cav. 1861, served through the war, and was made brevet brig.gen. vols.; and was appointed col. of 5th cav. 1887.—See *Life of Benjamin Franklin Wade*, by Albert G. Riddle (1888).

WADHAM COLLEGE, *wād'am*, Oxford: one of the colleges of Oxford Univ., England; founded 1610 by Dorothy Wadham, acting as executrix of the will of her deceased husband, Nicholas Wadham, who had died in the preceding year. Dorothy Wadham purchased the site and ruins of the priory of the Austin Friars, in the suburbs of Oxford, and built the present college for a warden, 15 fellows, 15 scholars, and 2 chaplains. By the commissioners under 17 and 18 Vict. c. 81, the fellowships and scholarships were thrown open—the former to all persons who had passed the examinations for a B.A. degree; the latter to all persons under 20 years of age. At present the number of fellowships is 14, one of them having been appropriated to

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the prof. of experimental philosophy. The scholarships are worth £80 a year, besides rooms, and are tenable for five years. There are several good exhibitions, especially those founded by Dr. Hody—four for Hebrew and six for Greek, value £45 a year each, and tenable for four years; also a law exhibition for a fellow, value £90 a year; and a medical exhibition for a fellow, of the same value. There are 13 benefices in the gift of this college.

WADI, or WADY, n. *wād'ī* [Ar. *wadi*, a valley, the channel of a river]: ravine or valley through which water flows; the channel of a water-course which is dry except in the rainy season.—The word is of frequent occurrence in the names of places in the East—e.g., Wadi-Musa (i.e., the Valley of Moses) in Arabia. In Spain, where most of the rivers bear names given them by the Arabs, *wad* has been transformed into *guad*—e.g., Wadi-l-abyadh (the White River) has become Guadalquivir.

WADSWORTH, *wádz'wérth*, JAMES: soldier: 1730, July 6—1817, Sep. 22; b. Durham, Conn. He graduated at Yale 1748. He was brig.gen. of Conn. militia 1776; was commissioned maj.gen. 1777, and ordered to New Haven, there to organize the defense of the coast towns. He was later chosen judge of the common pleas of New Haven co.; was delegate to the continental congress 1783–86; and member of the executive council 1785–90.

WADS'WORTH, JAMES: educator: 1768, Apr. 25—1844, June 8; b. Durham, Conn. He graduated at Yale 1787. In 1790, in company with his brother William, he removed to the Genesee valley, western New York, and through the rise in value of land, large quantities of which they had purchased, he became one of the richest landholders in the state. He gave much effort and much money to advance popular education, publishing and circulating, at his own expense, works on this subject, and employing lecturers to speak on it. As early as 1811 he recommended the establishing of normal schools, and 1838 procured the enactment of the N. Y. School Library Law. He founded and liberally endowed a library and scientific institution at Geneseo. In selling his land he always stipulated that two tracts of 125 acres each, in every township, should be given, one for the support of a school and the other for a church. He died at Geneseo.

WADS'WORTH, JAMES SAMUEL: soldier: 1807, Oct. 30—1864, May 8; b. Geneseo, N. Y. He was educated at Harvard and at Yale; studied law in Albany, and was admitted to the bar 1833, but never practiced the profession, occupying himself with the management of his patrimonial estate of 15,000 acres in w. N. Y. He adhered to the free-soil faction of the democratic party 1848, and joined the republican party soon after its formation. In the first Bull Run battle he was volunteer aide to Gen. Irvin McDowell; was commissioned brig.gen. vols. 1861, Aug. 9; became milit. gov. of the Dist. of Columbia 1862, Mar. 15; in Dec. took command of a division in the Army of the Potomac under Gen. Burnside, and had part in the battle

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of Fredericksburg; at Gettysburg, 1863, July 1, his division was the first in action and was reduced from 4,000 to 1,600 men. During the succeeding two days W. held the heights on the right of the Union line; after the victory his voice in the council of war was for a vigorous pursuit of the defeated Confederate army. He was assigned to command the 4th division of the 5th corps of the reorganized Army of the Potomac 1864, and while rallying his troops in the battle of the Wilderness received a bullet in the head 1864, May 6, and died 2 days afterward. He was brevetted maj. gen. of vols. on the day of the action in which he was wounded. His services and sacrifices were great and memorable.

WADS' WORTH, PELEG: revolutionary soldier: 1748-1829, Nov. 18; b. Hiram, Oxford co., Me. Having graduated at Harvard, he was first a schoolmaster, then a merchant. At the outbreak of the revolutionary war he was made capt. of a company of minute-men. He was later appointed adjt. gen. for Mass.; was present in the battle of Long Island; was commissioned brig. gen. of militia 1777; was second in command in the Penobscot expedition 1779, and was taken prisoner; after release he was again captured in his house by British soldiers and held prisoner at Castine, Me., 1781, Feb.—June, when he escaped. He was elected member of the state senate of Me. 1792, and representative in congress 1793-1807. Congress granted him a large tract of land in Oxford co., Me., in recognition of his military services; he settled on this land after retiring from congress, and greatly developed its resources.

WAFER, n. *wā'fēr* [OF. *waufre*; F. *gaufre*; Dut. *wafel*, a thin cake made by baking it between the round flat cheeks of a peculiar pair of tongs: Ger. *waffel*, a wafer; *wabe*, a honeycomb]: small, thin, round, dry piece of colored paste (made of flour, water, gum, and some non-poisonous coloring matter) used for sealing letters, documents, etc.—now largely superseded by the use of gummed envelopes; the small round piece of unleavened bread or paste used in the Rom. Cath. Chh. in the celebration of the Eucharist: V. to seal or close with a wafer. WA'FERING, imp. WA'FERED, pp. *-fērd*. WA'FERER, n. *-ēr*, in *OE.*, a vender of wafers. WAFFLE, n. *wōf'fl*, a thin batter-cake baked in waffle irons and served hot.—The *Wafers* used in the Rom. Cath. Church are of different sizes, the smallest about an inch in diameter for the communion of the people, a second considerably larger for the celebration of the mass, a third still larger to be placed in the Monstrance (q.v.) for the service of benediction or exposition: see LORD'S SUPPER. In ancient times the bread and wine for the Eucharist were contributed by the faithful; and a place is found in the eucharistic service of every known liturgy for this offering, still known by the name Offertory (q.v.). But in the Latin Church, the bread (which, as being unleavened, and different from that in common use, needed special preparation) has been provided for many centuries by the clergy; and the practice has been followed of pre-

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paring it in the form of thin cakes, commonly, though not necessarily circular, and frequently impressed with sacred representations or emblems, as the Crucifixion, the Lamb, the Christian monogram, the Cross, and other sacred symbols. The circular form itself is by some ritualistic writers regarded as symbolical, the circle being a figure of perfection.

WAFT, v. *wāft* [Scot. *waif*, *waff*, to blow: Dan. *vift*, a puff of wind: Sw. *vesta*, to waft, to winnow (see also WAVE)]: to convey or transport through a fluid medium, as air; to float, as on the water or through the air; in *OE.*, to beckon; to inform by a sign; to cast lightly or gently: N. a signal made by moving something, as a flag, in the air; a slight breeze. WAFT'ING, imp.: N. a bearing or floating, as on water or through air. WAFT'ED, pp. WAFTAGE, n. *wāft'āj*, in *OE.*, carriage by water or air. WAFT'ER, n. -*ér*, one who or that which wafts or conveys. WAFTURE, n. *wāft'ūr*, in *OE.*, the act of waving.

WAG, v. *wäg* [Dut. *waggelen*, to stagger, to totter: Sw. *vagga*, to rock: Ger. *wackeln*, to wag, to totter: AS. *wagian*, to rock, to move]: to shake lightly; to move to and fro, as the head in fun or mockery; to move with quick turns from side to side; to stir; to move on; to depart; to be off. WAG'GING, imp.: N. the act of one who or that which wags. WAGGED, pp. *wägd*.

WAG, n. *wäg* [probably from *wagging* the head as a sign of derision, or a contraction of *waghalter*, one fit to *wag* in a halter: comp. W. *gwaŷ*, void, empty]: a joker; one who plays tricks; a man full of sport and humor. WAG'GERY, n. -*gér-ĭ*, mischievous merriment; pleasantry; jocularity. WAG'GISH, a. -*gĭsh*, mischievous in sport; done in sport; full of sport and humor; frolicsome. WAG'GISHLY, ad. -*lĭ*. WAG'GISHNESS, n. -*nĕs*, the state or quality of being waggish; mischievous sport.

WAGE, v. *wāj* [OF. *wage*, a pledge or guarantee—from mid. L. *vadium*—from L. *vas* or *vadem*, a surety: Goth. *wadi*; OHG. *wetti*, a pledge, a security: It. *gaggio*; F. *gage*, a surety]: to make or carry on, as war; in *OE.*, to attempt; to venture; to wager; to throw down as a pledge: N. in *OE.*, a gage; a pledge. WAGING, imp. *wāj'jĭng*. WAGED, pp. *wājġd*, carried on, as war.

WAGENINGEN, *vā'ghĕn-ĭng-ĕn*: town in the Netherlands, prov. of Gelderland; near the Rhine, and connected with it by a canal. W. has good schools and other useful institutions. The environs are beautiful, and the Wagingsche Berg, now formed into a burying-place, is especially picturesque. Ship-building, brick and tile making, tanning leather, rope-spinning, etc., with agriculture, are the chief sources of wealth. W. received the rights of a town 1263. It is a neat, purely Dutch town, selected as a residence for its quietness, comfort, and economy.—Pop. 6,320.

WAGER—WAGES.

WAGER, n. *wā'jēr* [mid. L. *vadiārē*; F. *gager*, to give pledges, to lay down stakes (see **WAGE** 1)]: an unsettled question whose opposite alternatives are supported by two parties, who lay down stakes to abide the decision of the event; a subject on which bets are laid; a bet; formerly, trial by battle: V. to hazard on the issue of an event; to lay a pledge; to offer a wager; to bet (see **BETTING**). **WA'GERING**, imp.: N. laying of a wager. **WA'GERED**, pp. *-jērd*. **WA'GERER**, n. *-jēr-ēr*, one who wagers or bets. **WAGER OF BATTLE**: see **BATTEL**, **TRIAL BY**. **WAGER POLICY**, policy of insurance issued to a party that has no insurable interest. Such policy or wager is void at law. It has nothing in common with legitimate insurance except its name and the form of the contract. Such a policy is issued to the party insured in such terms as to preclude the question whether he has an interest, the formula being 'interest or no interest,' or 'without further proof of interest than the policy.'

WAGER OF LAW: an old form of giving sureties, in an action of debt based on an unwritten contract that at some future time the party would wage his law—that is, put it to the oath of the defendant, who swore in presence of 11 compurgators as to the debt claimed. This action has long been abolished.

WAGES, n. plu. *wā'jēz*, less frequently **WAGE**, n. *wāj* [F. *gages*, wages, money paid to a person as a pledge for his services (see **WAGE**, above)]: that which is paid at stated periods for labor or services rendered—usually restricted to daily, weekly, or fortnightly sums paid to laborers and mechanics: payment; recompense; reward. **WAGE**, v. in *OE.*, to take on hire; to hire for pay; to employ for wages. *Note.*—*Pay* is the general term for compensation for services rendered. *Fee* is the sum paid for some specific service, as to a physician, a lawyer, an official for registering documents, or the like. *Salary* and *stipend* imply more continuous (and usually, in some sense, official) service, compensation for which is usually reckoned at so much per annum—an editor's *salary*, the minister's *stipend*.—**SYN.** of 'wages': pay; fee; salary; stipend; hire; allowance; compensation; remuneration; fruit.—*Wages* are more absolutely ruled by their value in the market than other services. A writer of poems or a painter of pictures does work which is exceptional—if, because of his great ability or high repute, people are willing to pay him any price that he may ask for his work, there is probably no one who can compete with him and undersell him. A lawyer or a physician also may have special qualities to a great extent excluding competition; and in appointments to offices requiring trust, judgment, and skill, a great many things have to be considered besides the question, who will do the duty cheapest? But in the staple hand-works—the making of clothes or shoes, the baking of bread, the building of houses or ships, and the like—there are uniform functions of the hand which a certain number of persons will always be found ready to give for a price. Strong efforts are made from time to time—by combinations.

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strikes, etc.—to make wages high. Their permanent success always depends on the great natural laws that ever prevail in the end where trade and labor are free: see CAPITAL: COMPETITION: LABOR: TRADE-UNION: ETC.

WAGES, ATTACHMENT (or ARRESTMENT) OF; known in some states as TRUSTEE PROCESS: see GARNISH, ETC.

WAGGLE, v. *wăg'gl* [from WAG 1, which see]: to move one way and then the other; to reel; to move quickly from side to side, as a bird its tail; to wag. WAG'GLING, imp. *-gl'ing*. WAGGLED, pp. *wăg'gld*.

WAGNER, *văg'nër*, WILHELM RICHARD: German musical composer and dramatist: 1813, May 22—1883, Feb. 13; b. Leipzig. His father died 1813, his mother six years later. At the age of 11 years he attempted to write tragedies; in school showed no aptness for learning; and when 16 years old was permitted to apply himself to the study of music; yet the time that ought to have been given to his lessons W. spent in writing overtures, one of which was produced in the Leipzig theatre. He then attended lectures on philosophy and art, but without serious application to study. At last, tired of trifling and dissipation, he returned to the study of music, soon becoming proficient in counterpoint. His first essay in operatic composition, *Die Feen*, was refused by stage-managers, and W., seeing that the public taste required works in the French or the Italian style, composed his *Rienzi*, in which the best characteristics of both are blended. He was director of the Magdeburg theatre 1834–36; and 1841 visited Paris to seek his fortune there; but though Meyerbeer befriended him heartily, W. could find no opening to fortune; and returning to Germany 1842, he succeeded in having the *Rienzi* accepted in Dresden, and it was there produced with complete success. The road to fortune now seemed open, and W. became a celebrity. He was appointed director of the Court Theatre, Dresden, and court chapel-master. But his *Fliegende Holländer* (in his own characteristic style), which was given at the Dresden theatre (1843), did not suit the public taste. Nothing daunted, W. began the composition of *Tannhäuser* (produced 1845), in which he obeyed his own artistic inspiration; again the musical taste of the public condemned both the drama and the music. W., confident that his ideas were essentially true, persevered in the face of determined opposition, producing *Lohengrin* (1850), the *Meistersinger* (1868); and later *Parsifal*. The critics complained of the absence of melody, and W. was represented as a wrong-headed genius wedded to impracticable theories. But the public meanwhile was growing accustomed to W.'s style, and before long came to recognize in his compositions melody of the purest strain: thus it was in Dresden; but elsewhere throughout Germany every theatre was closed against the innovator. W., not content with giving the highest artistic expression to his ideas in the dramas themselves, bestowed infinite care on the presentation of them, choosing always the best artists, and constantly revising text and instrumentation.—In the insurrectionary events of 1849 W. was in full sympathy with the revolu-

tionists, and was active in the rising at Dresden. When order was restored, he fled to Zürich, where he at first turned to literature for a livelihood, producing three books written in characteristic style and spirit: *Art and Revolution* (1849); *Art of the Future* (1850); *Opera and Drama* (1851). W. never recanted his revolutionary and democratic principles.—In 1855 W. was in London, director of the Philharmonic Society's concerts. In the mean while, Franz Liszt (q.v.) had produced W.'s *Tannhäuser* at Weimar, and to the perfect satisfaction of W., who witnessed the performance while on his way to Zürich. Liszt produced also *Lohengrin* (1850) with brilliant success, and encouraged W. to persevere. In his exile he became interested in the dramatic reproduction of the German mythology, and determined to complete the dramatization of the *Nibelungenlied*. As a sort of program of his proposed cycle he published 1853 his poetical work *Der Ring des Nibelungen*. Liszt was ever striving to obtain for W. opportunity to develop his genius and produce his works on the German stage; but the public was still largely indifferent, and W., having completed *Rheingold*, *Walküre*, and the first two acts of *Siegfried*, rested at last discouraged. But this mood lasted only a short time; soon he produced *Tristan und Isolde*, in which he out-Wagnered Wagner. First in 1864 was he enabled, by the magnificent generosity of the young Bavarian king Louis (who invited him to Munich), to follow freely the bent of his genius as composer and dramatist, and to put on the stage his works with such equipment, scenery, stage-machinery, etc., as he deemed indispensable for their competent presentation. The *Meistersinger*, thus produced at Munich 1868, at once achieved brilliant success. Then, for the representation of the Nibelung cycle, the Wagner Union (Wagner unions had been formed in several towns) erected for him at Baireuth (q.v.), in n. Bavaria, a special grand opera-house, planned by the composer himself, to realize his peculiar ideas as to the essentials of a building for grand musical drama. Its foundation-stone was laid with great ceremony 1872, May, by W., in the presence of a host of his admirers; and for its opening (1876) he prepared a great operatic tetralogy, *Der Ring des Nibelungen*. Its cost, far beyond the estimates, was defrayed by the king.—W. died at Venice; and was buried at Baireuth, in a tomb that he had constructed for himself in the garden of his home.

In all W.'s operas, the words of the libretto, his own composition, are adapted to a declamatory style of recitative, relieved by harmonies and instrumentation in accordance with the spirit of the situation. They are often magnificent in spectacle, but are purposely deficient in what is commonly understood as melody. W.'s position amounts to this, that the highest mission and true end and object of music are realized only when it is the exponent of poetry, and that instrumental music is practically dead. A specially magnificent representation of the *Ring des Nibelungen* (in its four parts, *Rheingold*, *Die Walküre*, *Siegfried*, *Götterdämmerung*) was given in London 1882. *Par*

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sifal, his last great work, based on the legend of the Holy Grail, was completed at Palermo 1882, Jan. 13, and brought out with marked success at Baireuth in July. W. wrote numerous books, mostly on musical subjects and often highly polemical; in *Beethoven* (1870, transl. by Dannreuther 1880) he explains his relation to Schopenhauer's philosophy. In 1836 W. married an actress at Königsberg, Fräulein Wilhelmina Planer; but after 20 years separated from her, and subsequently married Cosima, daughter of Liszt and divorced wife of Hans von Bülow.—See Hueffer's *Wagner* (Lond. 1881).

WAGON, or WAGGON, n. *wäg'gōn* [AS. *wægn*; Dut. *wagen*; Dan. *vogn*; Icel. *vagn*; Ger. *wagen*, a wagon; allied to Skr. *vaha*, a car: L. *vehēre*, to carry]: a four-wheeled vehicle for carrying goods, etc.; an open truck used in the goods traffic of a railway; in OE., a chariot. WAG'ONAGE, the price of conveyance by wagons, especially on a railway; wagons collectively. WAG'ONER, n. -*ēr*, one who conducts or drives a wagon; name applied to Charles's Wain. WAG'ONETTE', n. -*ēt'*, an open four-wheeled carriage.—*Wagons* vary in construction according to the traffic in which they are employed. Most wagons are set on springs. For facility in turning, the fore-wheels are often smaller than the hind ones; and in addition, the fore-axle of the lighter kinds of wagon is attached to the body of the wagon by a swivel-joint, the shafts or pole being in this case attached to the fore-axle; but diminution of the size of wheels has the disadvantage of greater friction. To control and subdue the momentum of a heavily-loaded wagon descending a slope, it is necessary to employ a drag of some sort—whose rudest forms are a thick cylinder of tough wood inserted between two spokes of the wheel, which, being carried upward in the wheel's revolution, is 'jammed' against the underside of the wagon-frame, and stops the wheel's rotation; and the *chain-drag*—merely a chain firmly fastened at one end to the wagon-frame between a fore and hind wheel, and furnished at the other end with a large hook, to hold the tire of the hind-wheel: also the method of chaining the fore and hind wheels together was in use. The *Shoe* and *Brake* (q.v.) are now mostly employed. Among many forms of wagon in common use are the brewer's *dray*, the *lorry* (in Great Britain), the agricultural *wain* (in Europe), the *truck*, the *van*, the *bullock-cart* (in s. Africa); also the lighter kind of covered vans used by grocers and other tradesmen to deliver their wares.

WAGRAM, *vá'grám*, or DEUTSCH-WA'GRAM, *doytch-*: village of Lower Austria, on the left bank of the Russbach, 10 m. n.e.-by-e. from Vienna; the site of the great battle between the French and Austrians (1809, July 5,6) which forced Austria to bow before Napoleon and submit to the onerous conditions of the fourth treaty of Vienna (q.v.). After the capture of Vienna, Napoleon resolved to pass the Danube and complete the prostration of Austria's military strength by the destruction of her last army—that under the Archduke Charles; and with this

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view he called in the Italian army, under Eugène Beauharnais, and all his outlying corps, concentrating them in and about the island of Lobau; and after a few feints calculated to mislead the archduke, who, stationed on the n. bank, was vigilantly guarding the various crossings, succeeded in effecting a passage on the morning of 1809, July 5, from the island of Lobau to the n. bank, opposite Enzersdorf, landing 150,000 infantry, 30,000 cavalry, and 600 pieces of cannon before six in the morning. When the morning light showed the Austrians how they had been out-manœuvred, they retreated across the plain of the March-field to its n. extremity, and took up a formidable position at W., and, being closely pursued, were, on the evening of July 5, attacked by a part of the French army. By the vigorous exertions of the archduke in person, the assailants—after a temporary success—were completely repulsed; and the Austrians, exulting in their second victory over Napoleon, waited in sanguine expectation the events of the next day. In the morning the archduke resolved to assume the offensive, and succeeded at first in defeating the French centre under Masséna, and in forcing their left into inextricable confusion, followed by total rout; but at the same time his own left was turned by Davout, and this success, followed by a successful attack of Macdonald on their centre, forced the Austrians to retreat, which they did in the most orderly manner, carrying with them 5,000 prisoners, and leaving 25,000 dead or wounded on the field of battle—the French loss being about equal. This drawn battle (the archduke having, as Savary says, ‘in reality no reason for retiring’) had all the moral effects of a victory for the French; and was followed July 11 by the armistice of Znaim, which resulted in the fourth treaty of Vienna.

WAGTAIL, n. *wăg'tāl* [from *wag* and *tail*]: small bird of the genus *Motacilla* and family *Motacillidæ*, now generally regarded as a sub-family (*Motacillinæ*) of *Sylviadæ*; distinguished by a lengthened and slender bill, long and pointed wings, rather long and slightly curved claws, and a long narrow tail which the bird incessantly wags up and down with a jerking motion—hence the name ‘wagtail.’ The genus *Motacilla* of Linnæus included many *Sylviadæ* not of this group—e.g., the Redbreast, Nightingale, Blackcap, and Blue-throated Warbler; but as now restricted, birds of this genus have a slender, awl-shaped, straight bill; nostrils oval, on the sides of the bill near the base, partly covered by a naked membrane; wings of moderate size, the first quill-feather the longest, the second and third nearly as long as the first, the tertials very long; tarsus much longer than the middle toe; tail of 12 feathers, long, and nearly equal at the end.—The wagtails run with great celerity, and seek their food on the ground—the food chiefly insects and small seeds. They frequent the margins of rivers and lakes, inundated fields, and other moist grounds. They make their nests on the ground, among moist herbage, or in stony places. Their flight is rapid and undulatory. They are natives of temperate regions of

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the old world. No species is found in America, except as a rare straggler from the other hemisphere. A common Brit. species is the PIED W. (*M. Yarrellii*), seven to eight inches in length with the long tail, and has prettily varied white and black plumage. The Pied W. is incessantly in motion, jerking its tail, running quickly along the ground in quest of insects, and making short flights from place to place, chirping as it flies. It is often to be seen wading in shallow water, in pursuit of aquatic insects, also catching minnows when they approach the surface. This species was long confounded with the WHITE W. (*M. alba*) of the continent of Europe, common from Sweden to the Mediterranean, and in many parts of Asia. The GRAY W. (*M. boarula*) is bluish gray above, with the rump and lower parts yellow, a black patch on the throat in summer. It is abundant in Europe, and is commonly seen on pastures, often in close attendance on cattle or sheep—whence the French name *bergeronette*, given to this and other species of W. of similar habits.—The YELLOW W. (*M. flava*) and the GREEN-HEADED W. (*M. Rayi*), also Brit. species, of which the latter is the more common, belong to a sub-genus, by some regarded as a distinct genus, *Budytes*, having the hind-claw very long and sharp, and thus approaching in character to the Pipits (q.v.) or Titlarks.

WAHABIISM, or WAHABEEISM, n. *wa-hâ'bē-izm* [Eng. *Wahabi*, *Wahabee*]: the doctrines, principles, and practices of the Wahabis (q.v.).

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WAHABIS, or **WAHABEES**, *wá-há'bêz*, or **WAHA'BITES**, *-bīts*: recent Mohammedan sect, now dominant throughout the greater part of Arabia. The movement, introduced by Wahab, is a fanatical and uncompromising Mohammedan reform, seeking to purge away the innovations and corruptions introduced in the course of ages, and to bring back the doctrines and observances of Islam to the literal precepts of the Koran and of the Sunna (q.v.), or oral instructions of Mohammed himself. This purified faith the W. consider it their duty to impose at the point of the sword—in this, too, following strictly the precepts and practice of Mohammed and the first caliphs.

The founder of the sect, Ibn-abd-ul-Waháb, was son of an Arab sheik or chief, and was born in Nejed or Nejd (the central highlands of Arabia), about the end of the 17th c.; d. 1787. He is said to have visited various schools in the principal cities of the East, and to have lived some years in Damascus; and here he is represented as forming the resolution to restore in its primitive shape the ruined structure of Islam. It was a difficult task. Throughout the Mohammedan world the precepts of the Koran had fallen into abeyance, especially among the Turks; and religion was little else than a round of external ceremonies—prayers, ablutions, fastings, worshipping of the holy sheiks or saints at their tombs, and other superstitious innovations. In central and e. Arabia, where the faith of Mohammed had never taken deep root, matters were even worse. According to Palgrave, 'almost every trace of Islam had long since vanished from Nejed, where the worship of the Djann (genii), under the spreading foliage of large trees, or in the cavernous recesses of Djebel Toweik, with the invocation of the dead and sacrifices at their tombs, was blended with remnants of old Sabæan superstition, not without positive traces of the doctrines of Moseylemah and Kermut. The Koran was unread, the five daily prayers forgotten, and no one cared where Mecca lay, east or west, north or south; tithes, ablutions, and pilgrimages were things unheard of.' Central Arabia was at that time divided among a multitude of virtually independent chiefs. One of these, named Sa'u'd (or Sao'ó'd), a young man of ardent and capacious mind, who ruled the small territory around the stronghold of Deraijeh or Dureeyeh (in Nejed), was the first important convert made by Ibn-abd-ul-Wahab after his return home: this young prince was induced by the Wahabi (about 1746) to draw his sword as apostle militant of the new, or rather revived, Islam. One after another, he subdued his heretical neighbors, offering them the alternative of conversion or extermination. His son and successor, pursuing the same policy, extended his sway till he was brought into hostile contact with the Turkish authorities of Bagdad, whence an unsuccessful expedition was sent 1797 against the W. by way of Hasa. The W. now grew bolder in their plundering excursions toward the Euphrates, and 1801 Sa'ud, son of Abd-ul-Aziz, led an army against the holy city of Meshed Hussein or Kerbela, took it, massacred the greater part of the in-

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habitants, destroyed the tomb of Hussein, grandson of Mohammed, and carried off the treasures. On this, a second Turkish army was sent from Bagdad against Nejed, but was routed, and the greater part slain. The W. (1803) laid siege to Mecca, which, after a resistance of two or three months, surrendered at discretion. Not the slightest excess was committed, but the people had to become W.—‘that is, they were obliged to pray more punctually than usual, to lay aside and conceal their fine silk dresses, and to desist from smoking in public. Heaps of Persian pipes, collected from all the houses, were burned before Sa’ud’s headquarters, and the sale of tobacco forbidden.’—Burckhardt. In 1804 the Wahabi forces took Medina, where they stripped the tomb of Mohammed of its accumulated treasures, and prohibited the approach to it of all but W., as they considered the reverence paid to it by the Turks and others as idolatrous. At Medina ‘the Wahiabis enforced with great strictness the regular observance of prayers. The names of all the adult male inhabitants were called over in the mosque after morning, midday, and evening prayers, and those who did not obey the call were punished.’

In the end of 1803 Sa’ud II. (grandson of the first Wahabite prince), perhaps the ablest ruler and warrior of the dynasty, had come to power; and for several years he extended and consolidated his dominion. Plundering incursions were made to the very vicinity of Bagdad, Aleppo, and Damascus; while the Wahabi sheik of Asir (s. of Hejaz) imposed the new faith on a great part of Yemen. On the e., Sa’ud took the islands of Bahrein, annexed a part of the Persian coast on the e. side of the Gulf, and exacted tribute from the sultan of Oman. This brought him into conflict with Great Britain, which sent (1808) a force and severely chastised the Wahabi pirates that infested the commerce of the Persian Gulf. A revolt of several of the s. provinces of Nejed was speedily suppressed, and a terrible example was made of the province of Harik and the town of Hütah, the town being completely demolished, and its inhabitants (males reckoned at 10,000) butchered.

From 1802 the W. had prevented the great pilgrim caravans from reaching Mecca, both because they held the observances of the Turk and Persian hajjis to be idolatrous, and because they were scandalized at the gross immorality and indecency openly practiced by these pilgrims. This brought into the conflict the sultan of Constantinople, the acknowledged protector of Mohammedanism, who ordered the pasha of Egypt to retake the holy cities. Medina was taken by the Egyptian forces 1812, and Mecca in the following year; and, in 1818 Ibrahim Pasha (q.v.) succeeded in penetrating into central Arabia, and decisively breaking the Wahabi force, and capturing their capital, Deraijeh, which was laid in ruins. For a time the Egyptians held the conquered territories; but, after successive insurrections and fierce conflicts, they gave up the struggle; and the Wahabi sway, under Abdallah II., became after 1850 more powerful and extensive than ever. In 1870 the

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Ottoman govt. sent a military force into the Persian Gulf, which occupied Hofhuf, cap. of Hasa, but was then unable to penetrate further into Nejed, the central region of the W.; but later, about 1875, the power of the W. was practically restricted to the neighborhood of the city El Riad.

According to Burckhardt, there is not a single new precept in the Wahabi code: the only difference between the sect and the orthodox Turks (improperly so termed) is, 'that the W. rigidly follow the same laws which the others neglect or have ceased altogether to observe. To describe, therefore, the Wahabi religion, would be to recapitulate the Mussulman faith.' One peculiarity of the W. is their zeal against gaudy dress—silk and gold ornaments—and tobacco. In their wars of conversion, 'No Smoking' has been a kind of battle-cry.—The recent traveller Palgrave, who came into more intimate contact with the W. than Burckhardt, has a much less favorable opinion both of their doctrines and their practice. He describes their empire as 'a compact and well-organized government, where centralization is fully understood and effectually carried out, and whose mainsprings and connecting links are force and fanaticism. . . . Incapable of true internal progress, hostile to commerce, unfavorable to arts and even to agriculture, and in the highest degree intolerant and aggressive, it can neither better itself nor benefit others.' The order and calm which it sometimes spreads over the lands of its conquest, Palgrave describes as the peace wrought by desolation. 'Its weakest point lies in family rivalries and feuds of succession. . . . But so long as Wahabiism shall prevail in the centre and uplands of Arabia, small, indeed, are the hopes of civilization, advancement, and national prosperity for the Arab race.'—Col. Pelly characterizes the W. as 'warlike Mohammedan Quakers.'

About 1860 a sort of Mohammedan religious revival, promoted by Wahabite missionaries, began in n.e. India, and multitudes were converted to the tenets of the sect. The machinations of these sectaries have caused much uneasiness to the English rulers of India. Their principal centre is Pajja, and from that town enthusiastic disciples of Wahabiism go forth stirring up hate against the English.

The following statistical table of the Wahabi empire was drawn up by Palgrave, mostly from the official registers at Riad: it shows the state of the empire as regards pop. when the power of the W. was at its height, 1860.

Provinces.	Towns or Villages.	Population.	Military Muster.
1. Aared,	15	110,000	6,000
2. Yemamah,	32	140,000	4,500
3. Harik,	16	45,000	3,000
4. Aflaj,	12	14,000	1,200
5. Wadi Dowasir,	50	100,000	4,000
6. Seley'yei,	14	30,000	1,400
7. Wo-hem,	20	80,000	4,000
8. Sedeyr,	25	14,000	5,200
9. Kasim,	60	300,000	11,000
10. Hasa,	50	160,000	7,000
11. Katif,	22	100,000	...
	316	1,219,000	47,300

The Bedouin populations within the territories number more than 70,000. Many of the towns are large, and populous to a degree that the current notions of central Arabia would not lead us to expect. The following are among those of which Palgrave estimates the pop.: Eyun, 10,000; Bereydah, 25,000; Oneyzah, 30,000; Toweym, 12,000—15,000; Horeymelah, 10,000; Mejmaá, 10,000—12,000; Riad, the cap. (which Col. Pelly has ascertained to be in lat. 24° 33' 34'', long. 46° 41' 48''), has probably about 40,000; Kharfah, 8,000; Hofhuf (Al-Hufhuf), 24,000. Katif (Khutif) is the most direct port of the Wahabi dominions; and the province Hasa, in which it is situated, is the richest.

To the n. of Nejed is a region, once a kingdom in alliance with Feysul, later a province of the Wahabi empire, then semi-independent, and finally aggregated to the Ottoman empire about 1875. It is divided into 5 districts—Djebel Shomer, Djowf, Kheybar, Upper Kasim, Teymar: pop. about 275,000, of whom 165,000 are Bedouins: the chief town and former cap. of the kingdom, Hayel, has pop. 22,000. The people for a time professed Wahabiism under duress; but when by the interference of Egypt they were enabled to throw off the Wahabite yoke, they returned to unreformed Mohammedanism.

Karsten Niebuhr (q.v.) is the first European writer who mentions the W.; Burckhardt, *Notes on the Bedouins and Wahabis* (1830), gives a sketch of the Wahabi doctrines and of their history down to 1815; Sir Harford Jones Brydges, resident at Bagdad, published a *Brief History of the Wahabys*. Later authorities are W. G. Palgrave, *Narrative of a Year's Journey through Central and Eastern Arabia* (1862-3); Lieut.col. L. Pelly, *From Oman to Nedjid* (1868); Hunter, *Our Indian Mussulmans* (1871).

WAHOO': see ELM.

WAIBLINGEN, *vî'bling-èn*: town of Würtemberg, on the Rems, in the circle of the Neckar; pop. (1890) 4,786.—It is usually credited with having given to the family of the Hohenstaufen the title which became Italianized into Ghibellines (see GUELFs AND GHIBELLINES); but Raumer (q.v.), historian of the Hohenstaufen dynasty, upholds the claim of another Waiblingen in Würtemberg, on the Kocher, in the circle of Jaxt.

WAIF: see under WAIVE.

WAIL, v. *wâl* [Icel. *væla*; W. *wylo*, to weep, to lament, to wail: Gael. *guil*, to weep: Goth. *wai*, woe!]: to cry out in sorrow; to express sorrow by a mournful crying; to lament; to bewail: N. loud and mournful weeping; audible sorrow. WAIL'ING, imp.: N. loud cries of sorrow; deep lamentation. WAILED, pp. *wâld*. WAIL'INGLY, ad. *-lî*. WAIL'FUL, a. *-fûl*, sorrowful; mournful.

WAIN, n. *wân* [another spelling of WAGON, which see]: four-wheeled carriage or cart for conveyance of goods; a wagon. CHARLES'S WAIN [see CHARLES'S WAIN]: the constellation Ursa Major or the Plow, so called from its fancied resemblance to a wain. WAIN'MAN, n. *-mân*, in *OE.*, the driver of a wain. WAIN'ROPE, n. *-rôp*, in *OE.*, a

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wagon or cart rope. WAIN'WRIGHT, n. -rit, a maker or builder of wagons.

WAINSCOT, n. *wān'skōt* [Dut. *wagen-schot*; Low Ger. *wagenschot*, the best oak-wood without knots: said to be a corruption of Dut. *wagen*, a wagon, and *schot*, a partition of boards—the primary meaning being, therefore, panelling used in building a coach, hence, generally, panelling for walls]: the panelled timber-work lining the walls of a room: such lining is very common in Elizabethan architecture: the name is frequently applied to the best kinds of oak-boards, from oak having been so much used for panelling: V. to line with panelled boards. WAIN'SCOTTING, imp.: N. the materials used for covering the walls of a room; act of lining a room with panelled boards. WAIN'SCOTTED, pp.

WAINWRIGHT, *wān'rit*, JONATHAN MAYHEW, D.D., D.C.L.: Prot. Episc. bp.: 1793, Feb. 24—1854, Sep. 21; b. Liverpool, England; of American parentage. He graduated at Harvard 1812; studied theology, and was ordained priest 1818; became asst. minister in Trinity parish, New York, 1819; and was rector of another parish in that city 1821-34; then became rector of a church in Boston; returned to New York 1837, and there ministered till he became provisional bp. of New York 1852. For many years before he was raised to the episcopate he was sec. to the board of bps. Dr. W. helped to establish the Univ. of New York. He was greatly esteemed for ability and fervor. He published several vols. of *Sermons*; *The Pathway and Abiding Places of Our Lord* (journal of a tour in Palestine); *The Land of Bondage* (journal of a tour in Egypt); *Book of Chants*; *Music of the Church*; *The Choir and Family Psalter*.

WAIST, n. *wāst* [W. *gwasg*, the waist, the place where the body is squeezed in—from *gwasgu*, to squeeze or press: also said to be derived from AS. *wæstm*, growth, as being the part of the body where a man's development is best seen]: the smaller part of the trunk of the body between ribs and hips; the middle part of a body; the middle part of a ship; the narrowest part of a violin and instruments of similar construction: something girding the waist; a garment covering the waist or trunk; a bodice; corsage; basque. WAIST'BAND, n. a sash or band round the waist; the upper part of trousers or the like which encompasses the waist. WAISTCOAT, n. *wāst'kōt* or *wēs'kōt*, a close-fitting under-coat without sleeves, covering the waist and reaching a little below it; a vest.

WAIT, v. *wāt* [OF. *waiter* and *guiter*, to observe, to watch: OHG. *wahta*; Ger. *wacht*, a watch, guard: It. *guardare*; F. *guetter*, to observe, to watch: connected with WATCH and WAKE 2, which see]: to be on the look-out for; to expect; to remain until something happens or some one arrives; to remain quiet; to stay; not to depart; to attend; to lie in ambush; to serve or attend, as a servant at table; the time occupied in waiting, as a long *wait*. WAIT'ING, imp.: ADJ. denoting one who attends on a person: N. the act of staying in expectation; attendance. WAIT'INGLY, ad. -li. WAIT'ED, pp. WAIT'ER, n. -ér, a servant

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in attendance; a tray or salver. WAIT'RESS, n. -rēs, female attendant—applied usually to a table attendant at inns, restaurants, etc. WAITS, n. plu. *wāts*, the musicians who perform late at night in the streets, about Christmas, and who visit residents during the day, asking for a Christmas or New-Year box (see below). WAITING-MAID or -WOMAN, a servant who attends on a lady in her chamber. IN WAIT, in ambush. IN WAITING, in attendance. TO WAIT ON or UPON, to attend, as a servant; to go to see; to visit; to attend to; to follow, as a consequence. WAITER ON PROVIDENCE, a time-server.

WAITE, *wāt*, HENRY RANDALL: editor and clergyman: b. Copenhagen, N. Y., 1845, Dec. 16. He graduated at Hamilton 1868, then was engaged in journalism till 1870; studied theol. in the Union Theol. Sem., New York, and 1871-74 was pastor of the Amer. chh. in Rome; was editor of the *International Review* 1876-7, and in the mean time and till 1880 pastor of a Presb. church in Pelham, N. Y. In 1891 he became acting pastor of a Congl. church in Brooklyn. W. was pres. of the Political Science Assoc. of New York 1876-7; special officer of the U. S. census 1880-83; editor of the *Boston Citizen* 1885-6; then editor of *Civics* in New York. He has pub. *The Motive of St. Paul's Life*; *Illiteracy and the Mormon Problem*.

WAITE, MORRISON REMICK, LL.D.: jurist: 1816, Nov. 29—1888, Mar. 23; b. Lyme, Conn.; son of Henry Matson W., chief-justice of Conn., and descendant of Thomas W., emigrant to Mass. about 1663, who is reputed to have been son of that Thomas W., judge, who signed the death-warrant of King Charles I. W. graduated at Yale 1837; was admitted to the bar and began practice in Maumee City, O., 1839; was member of the state legislature 1849; settled in Toledo, O., 1850, and there practiced law, holding eminent rank in his profession. He was of counsel to the United States before the international arbitration commission at Geneva 1871-2, his associate counsel being Caleb Cushing and William M. Evarts. He formulated with convincing force the case of the United States with regard to the supplies furnished to Confederate cruisers in British ports. He was elected by both the chief political parties to the O. constitutional convention 1874, and was unanimously chosen its pres. He succeeded Samuel P. Chase as chief-justice of the U. S. supreme court 1874. While he was on the bench, many very grave questions of constitutional law came up for determination—in particular, the authoritative interpretation of the latest three amendments to the constitution: the powers of congress, the rights of states, the privileges of citizens, were concerned. W.'s freedom from the bias of political partizanship was manifest in his judicial decisions on these and other questions. He refused emphatically, 1876, to be a candidate for the presidency of the United States; he also declined to serve on the mixed Electoral Commission (q.v.) of supreme-court justices, senators, and representatives, created for the purpose of determining the conflicting claims of Hayes and Tilden to the presidency.

WAITS—WAIVE.

WAITS, *wāts* (formerly erroneously spelled *Waightes*): originally watchmen who announced the hours of the night by sounding a horn. In England in the time of Edward IV. the waits appear to have formed a distinct class from both the watch and the minstrels. It was their duty, we learn, from Rymer's *Fœdera*, to pipe the watch nightly in the king's court from Michaelmas to Shrove-Thursday four times, in the summer nights three times, and to make 'the bon gayte' at every chamber-door and office, for fear of pykeres and pillers. The waits were not confined to the court: there were musical watchmen at an early period in many provincial towns. In Exeter a regular company existed in 1400. Beaumont and Fletcher (*Knight of the Burning Pestle*) speak of the 'waits of Southwark as rare fellows as any in England.' The word in the provinces was afterward applied sometimes to the town musicians, who may have represented the old waits, but who had no duties as watchmen. The name was given also to the town band or to private musicians when employed as serenaders. In this sense it is used in the *Tatler* (No. 222): the writer says that it had become so much the custom in Nottingham for lovers to employ the waits to assist them in their courtship that the ladies of that place could get no sleep. Till a comparatively recent time, waits were officially recognized in London and Westminster. In London the post of leader of the waits was purchased; in Westminster, the appointment was in the gift of the high constable and court of burgesses. At present, in London, the waits are musicians who play during the night or early in the morning for two or three weeks before Christmas; calling afterward at the houses of the inhabitants to ask for a Christmas-box. In Glasgow, Scotland, the magistrates still grant certificates to a few musicians, generally blind men, who play in the streets night and morning for about three weeks previous to New-Year's Day: like the London waits, they call at the houses of the inhabitants, show their credentials, and ask a small subscription.—See Chambers's *Book of Days*, II. 742.

WAITZEN, *vîl'tsën*: town of Hungary, charmingly situated on the left bank of the Danube; 21 m. n. of Pesth, on the Vienna and Pesth railway. It is a bishop's see, contains a noble cathedral with conspicuous dome, built 1777, and a handsome episcopal palace. Considerable wine-culture is carried on, and there are important cattle-markets.—Pop. (1880) 13,199; (1890) 14,450.

WAIVE, v. *wāv* [mid. L. *waviārē*, to abandon; *wayvium*, a waif, Latinized from OF. *guesver*, to waive; *wayve*, anything wandering at large without an owner: Scot. *waif*, to blow: Icel. *veifu*, to vibrate (and see **WAF**)]: to relinquish, not to insist on or claim; to defer for the present; to give up claim to; in *law*, to abandon; to cast off: N. in *OE.*, a waif. **WAIV'ING**, imp. **WAIVED**, pp. *wāvd*. **WAIV'ER**, n. *-ēr*, one who does not insist on some right or claim; in *law*, relinquishment of a right, or refusal to accept it. In law practice, the party that at proper time neglects to take advantage by his rights makes waiver. **WAIF**, n. *wāf*,

anything drifted in by the ocean; a thing tossed abroad and abandoned; anything wandering at large without an owner; a thing found, but claimed by nobody; stolen goods thrown away by a thief when pursued; a worthless wanderer; a castaway. WAIFS AND STRAYS, the unsettled, wandering, and worthless members of society.

WAIWODE, *n.* *wā'wōd*: a variant of VAIVODE.

WAKE, *n.* *wāk* [Icel. *vaka*, I open or cut into; *vök*, an opening cut in ice]: the track or streak of smooth water left by a ship or other body moving in the water.

WAKE, *v.* *wāk* [Icel. *vaka*; Goth. *wakan*; Dut. *waken*; Sw. *vaka*; AS. *wacian*; Ger. *wachen*, to wake]: to be awake; to rouse or be roused from sleep; to watch; to refrain from sleeping; to be alive or active; to put in motion or action; to excite; to bring to life again; to watch or wait on a corpse till interment takes place: *N.* the sitting up all night with a deceased person—in some countries usually accompanied with drinking, etc.; in *eccles.*, a Vigil (q.v.); an annual festival in commemoration of the dedication of a parish church, formerly observed by watching all night and feasting (see below): in *OE.*, the state of being wakeful; a feast or merry-making. WA'KING, *imp.*: *ADJ.* not sleeping: *N.* act of rising from sleep; period of continuing awake. WAKED, *pp.* *wākt*. WAKEFUL, *a.* *wāk'fūl*, not sleeping. vigilant; stirring from sleep. WAKEFULLY, *ad.* *-lī*; WAKEFULNESS, *n.* *-nēs*, want of sleep; forbearance from sleep. WAKEN, *v.* *wā'kn*, to cease to sleep; to rouse from sleep; in *OE.*, to produce; to excite. WA'KENING, *imp.*: *N.* the act of rousing from sleep. WA'KENED, *pp.* *-knd*. WA'KENER, *n.* *-kn-ēr*, or WA'KER, *n.* *-kēr*, one who wakens or arouses from sleep. WA'KER, *n.* *-kēr*, one who shares in a wake or death-watch. WAKE'ROBIN, *n.* *-rōb'īn*, a monocotyledonous plant having acrid properties, the root of which yields a starchy matter; familiarly called Jack-in-the-box, from the peculiar arrangement of the parts of its flowers; the *Arum maculatum*, ord. *Arācēæ*, also called cuckoo-pint (see ARUM).

WAKE, *wāk*: English equivalent of the ecclesiastical *Vigil* (q.v.). In early times the day was considered as beginning and ending at sunset; consequently Sundays and holidays began on the *eve* of the holiday or Sunday (i.e., on the evening previous); and worshippers then repaired to the churches. The following day was spent in amusement. Each church when consecrated was dedicated to a saint, and on the anniversary of that day was kept the parish W. In many places there was a second W. on the birthday of the saint. On these occasions the floor of the church was strewn with rushes and flowers, and the altar and pulpit were decked with boughs and leaves. In the churchyard, tents were erected to supply cakes and ale for the crowd on the morrow, which was kept as a holiday. The second part of the festival seems to have made most impression on the popular mind, and the word wake came to be applied to it. Crowds came from neighboring parishes, hawkers or merchants were attracted, and ulti-

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mately these wakes became mere fairs or markets, often disgraced by scenes of indulgence and riot. In 1285 Edward I. forbade fairs and markets to be held in country churchyards; and in 1448 Henry VI. ordained that all display of goods and merchandise, except necessary victuals, should be discontinued on the great festivals of the church. But the evil continued. An act of convocation passed 1536, during the reign of Henry VIII., seems to have effected a more important change. It ordered the day of the dedication of the church to be kept in all parishes on the Sunday first in Oct., and gradually that festival ceased to be observed. The saint's-day festivals were not, however, affected and they are still kept in many English parishes under the name of 'country wakes.'—A *lyke-wake* or liche wake is a watching of a dead body (AS. *lic*) all night by the friends and neighbors of the deceased. The custom—now confined principally to lower classes of Irish Rom. Catholics—no doubt originated in superstitious fear that the dead body might be interfered with or carried off by evil spirits.—See Brand's *Popular Antiquities*, by Ellis.

WAKEFIELD: village and township in Middlesex co., Mass.; on the Boston and Maine railroad; 10 m. n. of Boston; formerly called South Reading. It contains 10 churches, public hall, 1 nat. and 1 sav. bank, high school, library, and 2 newspapers; is noted for its manufactures, which include rattan goods, boots and shoes, pianos, and stoves. It is a place of thriving business; and some of its churches have unusually fine buildings. Pop. (1880) 5,547; (1890) 6,982; (1900) 9,290.

WAKEFIELD: town and parliamentary borough of England, shire-town of the West Riding of Yorkshire; overlooking the Calder; 9 m. s. of Leeds, on the Lancashire and Yorkshire railway; 175½ m. from London. The town consists of three principal and many minor streets, and among the chief buildings are the parish church of All Saints, consecrated 1329, conspicuous from its lofty and elegant spire, rebuilt 1860–1; the grammar school, a wealthy institution, founded 1592, attached to which are six exhibitions to the universities; the library and news-rooms, corn exchange, etc. Its benevolent and scientific institutions are numerous and important. The Calder is here spanned by a fine stone bridge of 8 arches, on which stands the Chantry of St. Mary, endowed by Edward IV. in memory of his father Richard, Duke of York, who was killed at the battle of Wakefield 1460. It is a Gothic structure, 30 ft. long, 24 ft. wide. The town has long been famous for manufactures of woolen yarn and cloths. The district around is agricultural, and the town is noted for its grain and cattle markets. Coal mines are worked in the vicinity. Pop. (1881) 30,854; (1901) 36,000.

WAKEFIELD, *wāk'fēld*, EDWARD GIBBON: social reformer and author: about 1796–1862, May 16; b. England. He was a land-surveyor, and, 1826, married at Gretna Green an heiress of 15 years, for which act he was imprisoned in Newgate, London, three years; the marriage was an-

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nulled by parliament. In prison, W. studied prison management, and after his liberation pub., after most laborious research, a volume of pretended *Letters from Sydney*, which for a time passed as a record of actual facts in the penal establishments in Australia. He pub., 1831, *Tracts Relating to the Punishment of Death*; 1833, *England and America* (2 vols.), the fruit of very careful study; and the same year, *A View of the Art of Colonization*. By his writings and speeches he was instrumental in procuring the abolition of the penal transporation. He settled in New Zealand later, and was one of the founders of that flourishing colony. He introduced in New Zealand the 'Wakefield system' for the disposal of public lands, which consists in selling small lots at low prices to actual settlers, and using the proceeds as a fund for introduction of more settlers.

WAKEN: see under WAKE.

WALA'CHIA: see ROUMANIA.

WALBRIDGE, *wawl'brīj*, HIRAM: lawyer: 1821, Feb. 2—1870, Dec. 6; b. Ithaca, N. Y. In childhood he settled with his parents in O., there received his education, and was admitted to the practice of law 1842. While Texas was still an independent state, W. emigrated thither with the purpose of establishing four newspapers in different quarters for advocacy of annexation to the United States; but before his plan could be executed, the state was annexed. He then returned to law practice in Toledo, O.; and removed to New York 1847. He represented a N. Y. dist. in congress 1853-55, and there labored to secure the passage of a bill for the construction of a railroad to the Pacific coast. He was repeatedly chosen pres. of national commercial conventions, and advocated free banking, reduction of taxes, and development of the resources of the w. territories.

WALCHEREN, *vál'chèr-èn*: island of the Netherlands, prov. of Zeeland; at the mouth of the Scheldt; 52,000 acres. The chief places are Middelburg (pop. [1887] 16,378), Flushing (pop. 12,005), and Vere or Campvere (see these titles). One-half is meadow, the other rich arable land, well wooded to the north. Where it is not protected by natural downs, strong dikes have been formed, that at West Kappelle being a magnificent work. The drainage-water is carried off by large sea sluices at Middelburg and Vere. Agriculture is the principal employment. Ship-building, beer-brewing, rope-spinning, weaving, wood-sawing, tanning, etc., are carried on, especially at Middelburg and Flushing. From the latter town a railway has been constructed through W. and S. Beveland to Bergen-op-Zoom, joining the other continental lines. Flushing has considerable shipping trade. The people chiefly are Protestants. In many parts are large artificial mounds, supposed to have been erected by the early inhabitants for refuge from high tides.—Pop. of island 45,000.

WALDECK-PYRMONT.

WAL'CHEREN EXPEDITION: disastrous British military expedition, 1809, undertaken to help the continental allies of Great Britain in the operations against France, by creating such a diversion as would prevent the concentration of Napoleon's strength, in overwhelming amount, against any one of his opponents. The expedition was planned 1807, when Prussia, Russia, and Austria all were in arms against France; but it was not till early in the summer of 1809 (when Napoleon, who had overwhelmed Prussia, and reduced Russia to neutrality, was gradually forcing Austria to succumb) that the Brit. ministry resolved to carry it out. The plan was to send a fleet and army up the Scheldt (q.v.) and attack Antwerp (the principal naval station and arsenal for n. France), whose fortifications, though formidable, were out of repair, and whose garrison at the time numbered only about 2,000 invalids and coast-guards; while there were not more than 10,000 French soldiers in Holland. After many needless delays, the expedition sailed 1809, July 28; and, to the number of 37 men-of-war, 23 frigates, 115 sloops and gunboats, accompanied by transports carrying about 41,000 soldiers, reached the Dutch coast on the following day. But, instead of obeying the orders of Lord Castlereagh, the minister of war, to *advance at once in force against Antwerp*, the commander-in-chief, Lord Chatham (elder brother of Pitt), frittered away his time in the reduction of Vlissingen (Flushing), which was not effected till Aug. 16, by which time the garrison of Antwerp had been reinforced by King Louis Bonaparte with the troops at his command (about 6,000), and by detachments sent from France, which swelled the garrison (Aug. 20) to 15,000 men. About the end of Aug., Chatham 'found himself prepared' to march on Antwerp; but by this time 30,000 men, under Bernadotte, were gathered to its defense, and the Brit. army was decimated by marsh-fever, so that success was not to be hoped for. However, it was judged desirable to hold Walcheren, in order to compel the French to keep a strong force in Belgium; accordingly, 15,000 men remained to garrison the island, the rest returning to England; but the malaria wrought fatal ravages; and as peace had been concluded between Austria and France, this force also was recalled. Thus an excellently devised scheme failed through the stupidity of the agent chosen to carry it out, and ended in a loss of 7,000 men dead, and permanent disablement of half the remainder.

WALDECK-PYRMONT, *vâl'dëk-për'mont*: small principality in n.w. Germany: consisting of two separate parts—viz., the old county of Waldeck (407 sq. m.), inclosed between Westphalia, Hesse-Cassel, and Prussia; and the small county of Pyrmont (26 sq. m.), about 30 m. n. of Waldeck. The government is a constitutional and hereditary monarchy, conducted in the name of the prince since 1868 by a Prussian lieut. gov. (Landes-director)—the country having found itself unable to bear its share of the military and other burdens imposed on it as a member of the North-German Confederation. **It has one vote in the federal**

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council, and one in the imperial diet. The legislature of W.-P. consists of a single chamber of 15 members, elected indirectly for three years, of whom 12 represent Waldeck and 3 Pyrmont. The scenery, continually alternating between mountain and valley, forest and plain, presents much natural beauty. Among the minerals are gold, copper, iron, and lead; and mineral springs occur. Agriculture and cattle-breeding are by far the most common pursuits, and, except leather, no articles are manufactured to any extent. An important article of export, and one from which the prince derives a considerable portion of his revenue, is the mineral water of the Pyrmont spa, annually visited by about 13,000 people.—Pop. (1885) 56,703, nearly all Protestants. The chief town is Arolsen, pop. (1900) 2,734. The noble house of W. is one of the oldest in Germany. Pop. W.-P. (1900) 57,918.

WALDEN, *walden*, JOHN MORGAN, D.D., LL.D.: Methodist Episc. bp.: b. Lebanon, O., 1831, Feb. 11. He graduated at the Farmers' (now Belmont) Coll., Cincinnati, O. 1852; was for two years a school teacher, then a journalist and 1857-8 edited and published a newspaper in Kan. He was elected to the Topeka legislature and to the Leavenworth constitutional convention (free-state), and 1858 was appointed supt. of public instruction; but the same year, returning to O., he became minister of the Meth. Episc. Chh. in the Cincinnati conference. He was corresponding sec. of the Meth. Episc. Freedmen's Aid Soc. 1866-68; then for 16 years was one of the publishing agents of the Western Book Concern. He was elected bp. 1884.

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WALDENSES, *n. plu. wål-děń'sěz*, or VALDEN'SES, *vái-*, and VAUDOIS: Christian community inhabiting a mountain tract on the Italian side of the Cottian Alps, s.w. from Turin. The dist. is bounded n. by the Dora Ripaira, s. by the Po, and is inclosed on all sides by spurs of the Alps, which divide it into three valleys—Perosa, drained by the Clusone; San Martino, drained by the Germanasca; and Lucerna, drained by the Pelice, all tributaries of the Po. These valleys lie between France and Italy, immediately s. of the great w. route into Italy by the passes of Mont Cenis and Genève. The inhabitants are thus brought into communication with both countries; indeed, they speak a dialect more closely allied to the dialects of Dauphiné than to those of Piedmont; and they have used French as well as Italian as the language of their liturgy. The religious doctrines of the W. are now similar to those of the Reformed churches. There is a minister in each parish, called a *barbe*, and the synod is presided over by an elected *moderator*. The W. had at one time bishops, but that was when the sect was more widely spread than it now is. Much has been said of the origin of the W. Their own historians assert that the community has remained from apostolic times independent of the Church of Rome, and boast that they can show a regular apostolic succession of bishops from the earliest period of Christianity till that of the Reformation. Recent investigations, however, show this statement no longer tenable. Dieckhoff (*Die Waldenser im Mittelalter*, Gött. 1851) and Herzog (*Die romanischen Waldenser*, Halle 1853) have submitted the early history of the W. to a critical examination; and the result to which they have come is, that the W. had not the early origin claimed for them, and were not Protestant before the Reformation, though they held some opinions which were in anticipation of those held by the Reformers. These scholars are also of the opinion that the W. do not take their name from *val*, *vallis*, a valley, as has been assumed, but from Peter Waldo, of Lyons, merchant of the 12th c., who was less the founder of a sect than the representative and leader of a widespread struggle against the corruptions of the clergy. The church would have tolerated Peter Waldo, as it had tolerated St. Francis of Assisi, founder of the Franciscans; and perhaps have allowed him to form a new order, had he not trenched upon ground dangerous to the hierarchy. He had the four gospels translated, and maintained that laymen had a right to read them to the people. His opinions were condemned by a general council 1179, and he retired to the valleys of the Cottian Alps. A long series of persecutions followed, but Waldo's followers could not be forced to abandon their opinions. They continued to be known as the *Leonisti*, from the place of their origin; the Poor People of Lyons, from their voluntary penury; *Sabotati*, from the wooden shoes they wore; and *Humilitati*, from their humility. It was natural that a body cruelly persecuted should stand aloof from the church, and even offer armed resistance; yet there is no record of the manner in which the W. first

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became a separate community. They are now shown to have been identical with the followers of Waldo; but they must not be confounded with the Albigenses (q.v.), who were persecuted at the same period. The protest of the W. against the Church of Rome related to practical questions only; that of the Albigenses related to matters of doctrine.

The W. seem to have spread at first in the upper valleys of Dauphiné and Piedmont, to which Waldo retired. They were subjected to persecutions 1332, 1400, and 1478, and driven into many parts of Europe, where their industry and integrity were universally remarked. So widely had the sect been scattered that it was said a traveller from Antwerp to Rome could sleep every night at the house of one of the brethren. In Bohemia, where many of them had settled, they, without forsaking their own community, joined the Hussites, Taborites, and Bohemian Brethren—a connection which led to a change in the principles of the Waldenses. They adopted the doctrines of the Reformers, and this led to more serious persecutions than they had previously undergone. Francis I. of France, in possession of Piedmont 1541, ordered them to be extirpated. They were massacred at various places in Dauphiné and in the valleys that they still occupy, especially at Merindol and Cabrière. Several persons who refused to abandon their faith were burned alive, yet the sect continued to exist. In 1560, the Duke of Savoy, who had recovered possession of Piedmont, urged by Pope Paul IV., forbade the W. to exercise their faith, under the penalty of being sent to the galleys for life. The W. sent the duke a petition and apology for their creed, which appeared to him so plausible that he suggested that a conference should take place between the Waldensian and Romanist divines. He was, of course, told that the proposition was monstrous and, under effectual inducements by the pope and the courts of Spain and France, he dispatched 7,000 men into the valleys, who were joined by two French regiments. The W. offered a gallant resistance, but were overwhelmed by superior force. Many prisoners were burned alive, and women and children were slaughtered. The duke was disgusted with these atrocities, and, though denounced as no better than a heretic at Rome, granted the W. an amnesty on condition that their worship should be performed only at certain places in the valleys of Lucerna and San Martino. The W. in the other districts, especially in the marquisate of Saluzzo, were then persecuted by the Jesuits. Charles I. of England sent two embassies to the Duke of Savoy to intercede in their behalf, but without avail. Victor Amadeus I., not long after, ordered the W. of Saluzzo, under penalty of confiscation of property and death, to become Rom. Catholics; and the edict was so rigorously carried out that, in a few years, none of the sect remained in the district. Charles Emmanuel II. directed a fresh persecution against the W. 1655. Some time before, the people of Lucerna, inflamed, it is said, by the discourses of Jean Leger, a popular preacher, set fire to a

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convent of Capuchins, and committed other excesses. An inquiry was made, and it was found that the W. had purchased property and built churches and schools in districts where no concessions had been granted them. They were ordered within 20 days to sell their property or recant. They resisted, under leaders named Jayer and Janavel, but they could not successfully oppose the forces sent against them. No quarter was shown to women and children, and atrocities were committed—especially by the French and Irish mercenaries in the service of the duke—which, recorded by Jean Leger, aroused indignation in all Prot. countries. Subscriptions were made in England for those who had survived the massacre. The Swiss cantons and the states of Holland sent envoys to the duke. Cromwell—then a terror to ecclesiastical persecutors, Rom. Cath. or Prot.—called the Prot. powers to unite against such atrocities, and addressed to the duke stern remonstrances in Latin letters written by Milton (see his famous sonnet); and Sir Samuel Morland, sent by Cromwell to the scene of cruelty, collected and brought back to England numerous manuscripts connected with the history of the W. The result was that a convention was concluded by which the W. were again allowed to exercise their worship. But, after some years, having no protector, they were again restricted as to worship; and in 1685 Louis XIV. revoked the Edict of Nantes, and ordered the Duke of Savoy to compel the W. to adopt the Rom. Cath. faith. They were accordingly commanded to emigrate or abjure their tenets within 15 days. They resisted, and were attacked by the troops of the duke on one side, and those of Louis XIV. on the other. They were overpowered, and the survivors could make no conditions. A large number were imprisoned at Turin, where many died; others were allowed to emigrate. Their whole property was confiscated, and handed over to Rom. Cath. colonists. When the Prince of Orange became King William III. of England (1688) the W. who had settled in Switzerland resolved to return to their valleys under the guidance of Henry Arnaud, one of their pastors. In 1689 they gathered from all quarters to the rendezvous in the great forest of the Pays de Vaud. On the night of Aug. 16 they embarked on the Lake of Geneva, landed on the opposite shore, and, after encountering determined opposition, reached the valley of San Martino, after a perilous march of 31 days. During the winter a French army of 22,000 men entered their territories, and in the following summer attacked their fortifications, but was repulsed with great slaughter. Fortunately the French and Piedmontese at this juncture quarrelled, and the Piedmontese, to secure the services of the mountaineers, granted them an amnesty. They are said to have fought not less than 18 battles against the French, and to have lost only 30 men. This was the last persecution against the Vaudois; but it was not till 1848 that they were put on a level with their Rom. Cath. fellow-subjects. They had then 18 pastors and 15 congregations: in 1879 there were 56 regular Waldensian congregations.

WALDENSIAN--WALDO.

(with 14,600 communicants), besides 24 'missionary stations' in various parts of Italy, as at Turin and Rome. In 1883 there were 43 churches and 38 mission stations in all Italy, with 37 ordained pastors, 6 evangelists, 56 teachers, and about 14,000 communicants. About three-fourths of the revenue of the church is derived from contributions received from the churches of Great Britain and other Prot. countries. The *Libera Chiesa*, a Prot. Italian church, is not connected with the Church of the Valleys. The W. have a college at Florence, and publish several denominational and missionary journals.—See the works of Botta, Bender, Morland, Gelly, Muston.

WALDENSIAN, n. *wōl-dēn'shan*: one of the Waldenses (q.v.): ADJ. of or pertaining to the Waldenses.

WALDENSTRÖM, *vāl'den-ström*, PETER, PH.D.: church reformer: b. Luleå, Sweden, 1838, July 20. Having passed the high school 1857, he studied theol., but meantime became prof. in a high school, which position he still (1892) holds. He was ordained minister of the Swedish Lutheran Chh. 1864, but never received a pastoral charge; he resigned his ministerial rank in the state chh. 1882, in order to be free to labor for the 'evangelical national institution,' a movement for the reform of religion in Sweden. W. had for years co-operated with the 'institution,' and had become one of its strongest leaders, zealously promoting evangelical reform by voice and pen. The movement has even been called by its Lutheran opponents 'Waldenströmsism.' After the death of Rosenius, founder of the movement, W. became editor of the journal *Pietisten*, the organ of the evangelical institution, and still edits it. Later the movement took the name *Svenska Missions Förbundet* (Swedish Mission Union): in its strong reaction from the ecclesiasticism of the state church, it has organized churches on essentially congregational principles. Dr. W. is a man of learning and an impressive public speaker. He visited the United States about 1890. He has published a great many books and pamphlets, and 1883 began a new version of the New Testament with notes.

WALDO, *wōl'dō*, DANIEL (known as 'Father Waldo'): Congregational minister: 1762, Sep. 10—1864, July 30; b. Windham, Conn. He was a soldier in the revolution; taken prisoner at the battle of Horseneck, and confined in the sugar house in New York; exchanged after two months of hardships, and returned home; graduated at Yale 1788; studied theology, and became pastor of Congl. churches at West Suffolk, Conn., Cambridgeport, Harvard, and Salem, Mass., and at Exeter, R. I. In 1855, at the age of 92 years, he was elected chaplain of the U. S. house of representatives. He died at Syracuse, N. Y.—lacking only six weeks of 102 years of age.

WAL'DO (or VAL'DO, or VAL'DEZ), PETER ~~see~~ WALDENSES.

WALDOBOROUGH—WALHALLA.

WALDOBOROUGH, *wōl'dō-bŭr-rō*: a town and port of entry in Lincoln co., Me.; on Muscongus river and bay, and on the Knox and Lincoln railroad; 15 m. from the Atlantic Ocean, 19 m. w. of Rockland, 30 m. e. of Bath. It has large shoe and clothing manufacturing interests; and contains hotel, several churches, libraries, a bank, schools, and weekly newspaper. It was settled by a German colony 1749. During the year ending 1903, June 30, the imports of merchandise at its custom-house aggregated \$75,141, imported direct from foreign countries. Pop. (1880) 3,758; (1890) 3,505; (1900) 3,145.

WALE, *n.* *wāl* [*AS. wala*, marks of stripes or blows: *Goth. valus*; *Icel. vōlr*; *Sw. wal*, a rod, a stick (see **WHEAL** 1)]: the raised streak left on the skin by a stripe; one of the thick timbers in a ship's side below the waterways, also called *bend*; a ridge or streak rising above the surface of cloth, etc.: *V.* to mark, as the skin, with stripes; to make wales or ridges on. **WA'LING**, *imp.* **WALED**, *pp.*

WALE, or **WAIL**, *n.* *wāl* [*Ger. wahl*; *Icel. val*, choice: *Icel. velja*; *Mæso-Goth. waljan*, to choose]: in *Scot.*, to choose; to select; to cull: *N.* the thing chosen in preference to another; the act of choosing.

WALES: see **ENGLAND: GREAT BRITAIN: PRINCE OF WALES: WELSH LANGUAGE AND LITERATURE.**

WALES, NEW SOUTH: see **NEW SOUTH WALES.**

WALES, PRINCE OF: see **ALBERT EDWARD, Prince of Wales.**

WALHALLA, *wōl-hāl'lá*, or **VALHAL'LA**: in Scandinavian mythology, the 'Hall of the Fallen' (Heroes); the palace of immortality in which those who had fallen in battle reside (see **WALKYRIE**). This brilliant hall stood in Gladsheim (the house of joy); in front of it was the beautiful grove Glasur, whose trees bore golden leaves. Before the hall, which was so high that its summit could scarcely be seen, a wolf was hung, as a symbol of war, over which sat an eagle; the saloon itself, ornamented with shields and wainscotted with spears, had 540 doors, through each of which 800 of the inmates (*Einherjer*) could walk abreast. For these *Einherjer* (i.e., the brave), who came after death to Odin, was it destined. Renowned chiefs, especially if they had desolated many countries and wielded the blood-dripping sword far and wide, were met and welcomed by Bragi and Hermode as messengers from Odin. The hall was decorated to honor them; all the divine heroes stood up at their reception; the Walkyries tasted wine for them, which otherwise only Odin drank. All kings came to W., even when they did not die on the battle-field: in general, these joys seem to have been prepared only for those of high rank and the rich. As it was honorable to come to W. with a great retinue and to possess many treasures, the comrades of a leader who had fallen in battle killed themselves of their own free will; and in his grave were laid, with his horse and arms, the treasures won in fight. Every morning the inmates of W. marched out at the crowing of the cock and fought furiously with one an-

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other; but at midday all wounds healed, and the heroes assembled to the feast under Odin's presidency. Odin himself partook of nothing but wine; he gave the edibles to the wolves Geri and Freki, who sat beside him. The guests ate of the bacon of the boar Sahrimmer, prepared by the cook Andhrimmer, in the kettle Eldhrimmer [see note below], and refreshed themselves with beer and mead, which flowed in abundance from the udder of the goat Heidrun; the attendant Walkyries handed them the drinking-horns, under Freyja's direction. Occasionally the hero rode by night to his grave, where the beloved Walkyrie received him; he reposed in her embrace till morning appeared, when he exclaimed: 'It is time to make the horse tread on the white stair of the sky; I must travel toward the west to the bridge of heaven before the cock awakes the warriors in Walhalla.' [Note.—*Sa* is explained as signifying water; *and*, breath or soul; *eld*, fire; *hrim*, i.e., frost, was the primitive matter of which the world was made; from the branches of the deer Eikthyrnir, standing over W., drops fell into the well Hvergelmer, from which all rivers flowed. According to this, the heroes appear to be conceived as stars or spirits of the constellations, which draw their nourishment from the elements; and W. stands for heaven.]

The name WALHALLA is given to a magnificent structure erected by Ludwig I. of Bavaria (1830-41) as a temple of fame for all Germany. He conceived the project 1806, when the Fatherland was at its lowest point of degradation, and while he was yet crown-prince. The design of the building was by Klenze, and the chief sculptors of Germany have contributed to the execution of the plan. It stands on an eminence 250 ft. above the Danube at Donaustauf, near Regensburg. The temple is of nearly the same dimensions and proportions as the Parthenon, and is built of marble. By statues, busts, reliefs, and tablets, the mythology and history of Germany are illustrated, and her greatest names commemorated. The undertaking cost 2,330,000 florins, about \$1,165,000.

WALK, *v. warok* [AS. *wealcan*, to roll, turn, tumble: Icel. *válka*, to roll in the hands: OHG. *walagôn*, to walk: Ger. *walken*, to full; *walker*, a fuller: Bav. *walken*, to move to and fro—*lit.*, to roll or wander about]: to go at a foot pace; to go or travel on foot; to pace; to pass through; to lead; to ramble; to live or behave; to pursue a particular course of life; in the language of invitation, come; go; to move for exercise or amusement; to appear as a spectre; to cause to go slowly, as to *walk* a horse; in *OE.*, to be in motion: N. act or manner of walking; pace; step; space through which one has walked; a place for exercise on foot; road; way; course of life; carriage; gait; deportment; pasture-ground, as for sheep; in *OE.*, avenue set with trees; region; space. WALK'ING, *imp.*: N. the act of moving on the feet at a slow pace. WALKED, *pp. warokt.* WALK'ER, *n. -er*, one who walks; in *OE.* and *Scot.*, a fuller. WALKING-CANE, a Walking-stick (*q.v.*). WALKING-FISH, a fish found in the Indian seas, with fins adapted to crawling on

WALKE—WALKER.

shore. SHEEP-WALK, an extensive tract of land where sheep are pastured. WALK OF LIFE, station or position.—The *Walk* is the slowest pace or gait at which land-animals move. When a biped *walks* there is always one foot on the ground; when a quadruped walks there are at least two feet on the ground at one time. In the walk of the horse and other quadrupeds the feet move in diagonal pairs—i.e., the near forefoot and the off hindfoot move together, and the off forefoot and the near hindfoot together. In the *trot* the feet move in the same way, but not with the same degree of simultaneousness.

WALKE, *wawk*, HENRY: naval officer: b. Princess Anne co., Va., 1808, Dec. 24. He entered the U. S. naval service as midshipman 1827; became lieut. 1839; served in the Gulf squadron during the war with Mexico; promoted commander 1855. At the opening of the civil war he was in command of the Pensacola navy-yard. He served on the Mississippi 1861–63, and took part in the battle of Belmont, in co-operation with the land-forces under Gen. Grant; for his conduct in command of the *Carondelet* at Fort Henry, 1862, Feb. 6, he, with the other officers of the naval squadron, received from congress and the state of O. votes of thanks; in the operations that resulted in the capture of Fort Donelson, W., with the *Carondelet*, from first to last bore the brunt of the fight. Equally brilliant were his services with the *Carondelet* at Fort Pillow 1862, May 11, and Memphis, June 6. Commissioned capt. July 16, he ran past the batteries at Vicksburg on board the ram *Lafayette*. He co-operated with the army in the battle of Grand Gulf, 1863, Apr. 29; dispersed an army under Gen. Richard Taylor at Simsport, La., and blockaded the mouth of the Red river June 4. Then he took command of the steamer *Fort Jackson*, and continued operations on the Mississippi till Sep. 24, when he was appointed to the command of the *Sacramento* and to pursue the *Alabama*, Confederate cruiser. He became commodore 1863, July 25, rear-admiral 1870, July 13; and was placed on the retired list 1871, Apr. 26. He d. 1896, Mar. 8.

WALKER, *waw'kér*, AMASA, LL.D.: political economist: 1799, May 4—1875, Oct. 29; b. Woodstock, Conn. Having received a district-school education, he entered commercial life 1820. He retired from business 1840, and 1842–48 lectured on political economy in Oberlin Coll., O. Returning to Mass., he was elected to the Mass. senate 1849, and promoted the enactment of a law for a secret ballot; he was sec. of state of Mass. 1851–2; member of the Mass. constitutional convention 1853; examiner in polit. economy at Harvard 1853–60; lecturer on polit. economy at Amherst 1859–69; in the mean time was representative in congress 1862, Dec. 1—1863, Mar. 3. Through life he was an earnest advocate of total abstinence and of anti-slavery. He was repeatedly a delegate to international peace congresses. His contributions to *Hunt's Merchant's Magazine* have been highly esteemed by students of finance. He published *Nature and Uses of Money and Mixed Currency* (1857); *Science of Wealth: a Manual of Political Economy* (1866).

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WALKER, BENJAMIN: soldier: 1753-1818, Jan. 13; b. England. Arriving at an early age in New York, he there became a merchant; served as captain and as aide to Baron Steuben and Gen. Washington in the revolutionary war. After the war he was sec. to the gov. of N. Y., and later was a broker in New York. He was naval officer there during Washington's administration, and was representative in congress 1801-03. For many years before his death he was manager of the Earl of Bute's great estates in the centre of the state.

WALKER, FRANCIS AMASA, PH.D., LL.D.: statistician: b. Boston, 1840, July 2; son of Amasa W. He graduated at Amherst 1860, and studied law. He entered a Mass. vol. regt. 1861, Aug. 1, as sergeant-maj.; appointed asst. adjt.gen. of a brigade, with rank of capt., Sep. 14; adjt.gen. of a division, with rank of maj., 1862, Aug. 11; promoted col. on the staff of the 2d army corps Dec. 23. He was severely wounded at Chancellorsville 1863, May 1; made prisoner at Ream's Station 1864, Aug. 25, and was confined in Libby Prison, Richmond. His health having been seriously impaired by the confinement, he resigned his commission 1865, Jan. 12; he was brevetted brig.gen. 1865, Mar. 13. After the war he was teacher of Latin and Greek at Williston Seminary 1865-67; was chief of the statistical bureau of the treasury 1869; supt. of the 9th census 1870-72, and during the same term commissioner of Indian affairs; was prof. of polit. economy and history in the Sheffield School at Yale Univ. 1873-81; then became pres. of the Mass. Institute of Technology in Boston. He was chief of the bureau of awards at the Centennial Fair, 1876, and supt. of the 10th U. S. census 1879-81; U. S. commissioner to the Paris international monetary conference 1878. Besides his official reports, Dr. W. pub. *The Indian Question* (1874); *The Wages Question* (1876); *Money* (1878); *Money, Trade, and Industry* (1879); *Land and Its Rent* (1883); *Political Economy* (1883); *History of the Second Army Corps* (1886). He published many articles on economic and social questions. He d. 1897, Jan. 5.

WALKER, FREDERICK: English artist: 1840, May 24-1875, June 6; b. Marylebone, London. At the age of 18 he was admitted a student at the Royal Acad. He was then supporting himself by designing wood-engravings, and his beautiful drawings in the *Cornhill* and *Once a Week* first attracted attention; but he soon abandoned this work for painting in oil and water-colors. He was made an associate of the Old Water-color Soc. 1863, a full member 1866, and an associate of the Royal Acad. 1871. A collection of 150 of his works, many of them considered masterpieces, was exhibited 1876. He died at St. Fillan's, Perthshire, Scotland.—W.'s works show originality in motive, in design, and in execution; his coloring is delicate and powerful, and all his pictures show refinement and poetry in sentiment.

WALKER, GEORGE, D.D.: Irish clergyman, distinguished in the heroic defense of Londonderry against the army of James II.; b. in the early part of the 17th c., in

the county of Tyrone; of English parents; d. 1689, July 1 (o.s.). He was educated at the Univ. of Glasgow, and became rector of Donoughmore. When the Irish army of James II. (see JAMES II., King of England) entered Ulster and took possession of Kilmore and Coleraine, W. sought refuge in Londonderry (q.v), the headquarters of 'the Englishry' since the times of James I. The town was fortified sufficiently to protect it from the pike-armed Celtic peasantry; but not for defense against regular troops. Lundy, the governor, was in secret communication with the enemy, and the bishop, Ezekiel Hopkins, inculcated the doctrine of passive obedience; but the high-spirited citizens determined not to yield. A daring band known as the 'thirteen Scotch apprentices' closed the city gates and defied the enemy. It was then that W., described as an aged clergyman who had taken refuge in the city, encouraged the townspeople to fight to the last. W. saved Lundy from the rage of the populace, and enabled him to quit the city in safety. Major Baker (who soon afterward died) and W. became joint-governors, aided by Capt. Adam Campbell. The siege (1689, Apr. 18—July 30) is memorable in British history. The inhabitants were reduced to the greatest extremities by hunger, but they were sustained to the last by the rousing sermons preached to them in the cathedral by W., and by the example of W. and Capt. Campbell in heading sallying-parties. When the siege was raised by the Eng. fleet entering the harbor, W. went to London, was warmly received at court, thanked by the house of commons, created D.D. by Oxford, and bp. of Derry by the king. His triumph would have been complete had the Presbyterians not provoked useless controversy, claiming that their share in the defense of the city was overlooked. W. could not be induced to take quiet possession of his bishopric; he would head a troop at the battle of the Boyne, and he was there killed.

WALKER, JAMES, D.D., LL.D.: Unitarian minister, philosopher, and educator: 1794, Aug. 16—1874, Dec. 23; b. Burlington, Mass. Having graduated at Harvard 1814, he studied theol., and was thereafter pastor of a Unitarian chh. in Charlestown, Mass., for 21 years, in the mean time lecturing in various places in the interest of popular education. He edited the *Christian Examiner* 1831-39. On resigning his pastoral charge 1839, W. became prof. of intellectual philosophy in Harvard, and was pres. of Harvard 1853 till he resigned 1860. His library, valued at \$15,000, he bequeathed to Harvard. Dr. W. had, in fine combination, intellectual strength and moral delicacy and fidelity. His sermons, lectures, and other addresses were from time to time collected and published under the titles *Natural Religion*; *Philosophy of Religion*; *Sermons Preached in the Chapel of Harvard Coll.* He wrote a *Memorial of Daniel Appleton*, and a *Memoir of Josiah Quincy*. He edited for students' use Dugald Stewart's *Philosophy of the Active and Moral Powers*, and Thomas Reid's *Essays on the Intellectual Powers*.

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WALKER, JAMES BARR, D.D.: Presbyterian clergyman: 1805, July 29—1887, Mar. 6; b. Philadelphia. He learned the printer's trade at Pittsburgh, Penn.; walked from Pittsburgh to New York 1826, and there was employed as clerk in a newspaper office. He went to O., studied law at Ravenna, graduated at Western Reserve College 1831; and afterward edited in succession several religious newspapers. He was licensed to preach by the Chicago presbytery 1841. He lectured on the relations of science and revelation at Oberlin College, O., and at the Chicago Theol. Seminary (Congl.). W. published anonymously, 1855, *The Philosophy of the Plan of Salvation*, a work which commanded wide attention; under his own name he published *God Revealed in Nature and in Christ* (1855); *Philosophy of Scepticism and Ultraism* (1857); *Doctrine of the Holy Spirit* (1870); and some other works.

WALKER, JOHN GRIMES: naval officer: b. Hillsborough, N. H., 1835, Mar. 20. Having graduated at the Naval Acad. 1856, he entered the U. S. navy; was promoted master and lieut. 1858. During the civil war he served in the blockade of the Atlantic coast 1861-2, and then in the western Gulf blockading squadron. He took part in the operations of the fleet at New Orleans and Vicksburg, Haines's Bluff, Fort Hindman, and the Yazoo expedition. He again served in the Atlantic blockading squadron 1864-5, and participated in the taking of the forts near Wilmington, N. C. W. attained the rank of commander 1866, capt. 1877. He was chief of the bureau of navigation 1881-89; was then assigned to command of the European squadron as acting rear-admiral; rear-admiral 1893; pres. naval retiring board, Washington, 1895; of Nicaragua Canal Com. 1897-99; pres. Isthmian C. C. 1899.

WALKER, JONATHAN: advocate of abolitionism: 1799-1878, May 1; b. Cape Cod, Mass. In early life he was capt. of a fishing-vessel; was railroad contractor in Florida 1840; aided slaves to escape thence in an open boat 1844, but the party were taken to Key West by a wrecking-sloop, which found them helpless at sea. W. was carried in irons to Pensacola, held for some time in prison chained to the floor of a dark cell, and on being tried was convicted, fined, condemned to the pillory, branded 'S. S.' (slave-stealer) on the right hand, and ordered to be confined in prison till the fine was paid. He was liberated after 11 months' imprisonment on payment of the fine by friends in the north. He then for some years delivered lectures on slavery, and 1850 settled in Muskegon, Mich. W.'s history suggested to Whittier the topic of his *Man with the Branded Hand*.

WALKER, ROBERT JOHN: statesman: 1801, July 23—1869, Nov. 11; b. Northumberland, Penn.; son of a revolutionary soldier and U. S. district judge. He graduated at the Univ. of Penn. 1819; began to practice law at Pittsburgh 1822; settled in Miss. 1826, and there besides practicing law entered political life: he was an earnest opponent of nullification, and favored federal coercion of

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states attempting to nullify the laws of the United States, 1832-3. He was elected to the U. S. senate 1836, Jan.; re-elected 1840, and in that body antagonized John C. Calhoun. He opposed Pres. Van Buren when Van Buren disapproved the annexation of Texas. W. then was influential in procuring the nomination of James K. Polk to the presidency, and on his election to that office Polk made W. sec. of the treasury. While in the senate W. proposed the Homestead Bill, advocated the conclusion of the treaty for suppressing the slave-trade, and supported all measures looking toward emancipation: he freed his own slaves 1838. He was made gov. of Kansas by Pres. Buchanan 1857, and in that office resisted the attempt to impose on Kansas a fraudulent constitution. At the outbreak of the civil war he advocated vigorous action to suppress the revolt of the slave-holding states. He was financial agent of the U. S. in Europe, and negotiated the sale of \$250,000,000 in govt. bonds 1863. He returned to the practice of law in Washington 1864.

WALKER, SEARS COOK: mathematician: 1805, Mar. 28—1853, Jan. 30; b. Wilmington, Mass. Having graduated at Harvard 1825, he was a schoolmaster first near Boston; then in Philadelphia, where he erected an astronomical observatory for the pupils of the high school 1837, and had it furnished with superior instruments: he published the results of his observations and researches periodically in the *Proceedings* of the Philosophical Soc. and the *Amer. Jour. of Science* 1840-52. While employed in the U. S. Observatory, Washington, 1845-47, he identified the then newly discovered planet Neptune with the star discovered by Lalande 1795. Thereafter till his death W. was in charge of longitude computations for the coast survey. Among his more notable contributions to science are: *Memoir on the Periodical Meteors of Aug. and Nov.* (1841); *Researches Relative to the Planet Neptune for* 1848-52.

WALKER, THOMAS: planter: 1715, Jan. 25—1794, Nov. 9; b. Gloucester co., Va. Having been educated at William and Mary College, he became a physician at Fredericksburg, Va. He made an expedition 1750 to the region that now is the state of Ky.—13 years before Daniel Boone entered it from Tenn. The Walker Mts. in s. Va. are named after W. He served as commissary-gen. under George Washington in Braddock's army; was commissioner on behalf of Va. to treat with the Six Nations at Ft. Stanwix, N. Y., 1768; commissioner to treat with the Indians at Ft. Pitt (Pittsburgh) 1777. He acquired a great estate by marriage toward the close of his life.—His son JOHN W. (1744-1809, b. Albemarle co., Va.) served with distinction on Gen. Washington's staff during the revolution: he was U. S. senator a few months 1790.

WALKER.

WALKER, TIMOTHY: clergyman: 1705, July 27—1782, Sep. 1; b. Woburn, Mass. He graduated at Harvard 1725, and having studied theol. became (1730) minister of the Congl. chh. at the Penacook plantation (now Concord, N. H.). When, 1740, the title of the Penacook settlers to their land was held by the province of New Hampshire to be null, and new claimants demanded possession, the courts deciding favorably to them, W. undertook the defense of his people's rights, and thrice visited England to maintain their cause; finally the king in council decided the suit in favor of the people of Penacook. W.'s theological belief was mildly Calvinistic. In the revolution he was an ardent patriot. He held the pastorate at Concord 52 years. His daughter married Count Rumford (q.v.).—W.'s son TIMOTHY W. (1737, June 26—1822, May 5) graduated at Harvard 1822, and at first was a preacher; then became active in the political life of the revolutionary time and the period subsequent—holding many important offices.

WALKER, WILLIAM: adventurer; 1824, May 8—1860, Sep. 12; b. Nashville, Tenn. Having studied law in Nashville, and medicine in Heidelberg, he was first a journalist in New Orleans and San Francisco. At the head of 170 men with 3 field-guns, he descended on La Paz, Lower California, 1853, July, intending to conquer the state of Sonora; but was attacked by Mexican troops and compelled to seek refuge in U. S. territory. He was tried at San Francisco on charge of acts against the peace of the United States, and acquitted. W.'s next filibustering expedition was to Nicaragua. Landing with 62 followers at Realejo 1855, June 11, he enlisted some native Nicaraguan malcontents, and attempted to seize the s. transit-route. He suffered defeat at Rivas, but, having obtained a fresh native reinforcement, routed the govt. force at La Virgen Sep. 1, and captured the city of Granada. He was then accepted as an ally by the existing govt. and appointed sec. of war and commander-in-chief: as such he was (1856, Mar. 1) in command of an army of 1,200 men, many of whom had come to him from the United States. War now broke out between Nicaragua and Costa Rica, and W., though defeated in the first collision, routed the Costa Ricans at Rivas, Apr. 11. He was now ruler of Nicaragua. To fill the treasury, he confiscated the property of the Vanderbilt Steamship Co., and revoked its charter. He procured his own election to the presidency, and by decree annulled the law prohibiting slavery. His acts provoked the people to revolt; and, abandoned by his army, W. took refuge on board a U. S. sloop of war at San Juan del Sur 1857, May 1; and was put under bonds at New Orleans to keep the peace; but engaged in still other filibustering enterprises—the last was against Honduras: there he was made prisoner by the commander of a Brit. naval vessel, was surrendered to the Honduras authorities, tried by court-martial, and shot to death at Trujillo

WALKER—WALKING-STICK.

WALKER, WILLIAM JOHNSON, M.D.: philanthropist: 1790, Mar. 15—1865, Apr. 2; b. Charlestown, Mass. He graduated at Harvard 1810, then studied med., and practiced as a physician in Charlestown. He became heir to a large estate late in life. His benefactions to colleges and to charitable and benevolent institutions were very liberal, amounting to \$1,400,000, of which \$400,000 was bestowed during his life.

WALKER, WILLIAM MCCREARY: naval officer: 1813, Sep. 2—1866, Nov. 19; b. Baltimore, Md. He became midshipman in the U. S. navy 1827; passed midshipman 1833; lieut. 1838; and while lieut. commanded a vessel in Wilkes's exploring expedition. He served on the home station 1843-4, and in the Mediterranean squadron 1844-46; commanded the frigate *Constellation* 1855-6. He attained the rank of capt. 1862; through the civil war he served with distinction on the steamer *De Soto* of the Atlantic coast blockading squadron.

WALK'ING-LEAF: see LEAF-INSECT.

WALK'ING-STICK: popular name of many insects of the family *Phasmidæ* (q.v.), which are destitute of wings, and have a long, slender, cylindrical body, like a small stick with the bark on, the delicate legs resembling little twigs. Their habits are very similar to those of the leaf-insects or walking-leaves, and their peculiar appearance is, in like manner, their protection. Most of them are natives of warm climates, and they are widely distributed. Some attain a large size. *Phasma gigas*, an E. Indian species, is seven or eight inches long. A species, between three and four inches long, *P. femoratum*, is found even in n. and n.w. parts of the United States.

WALKING-STICK, *wawk'ing-stĭk*: a cane or rod prepared for use in walking, either as an assistance in supporting and steadying the walker, or for ornament. The habit of using walking-sticks is of great antiquity; and in modern times the supply of such articles constitutes a large branch of trade in the United States, as well as in European countries, especially in Great Britain, France, and Germany. London is a great mart for all kinds of walking-sticks, and over 4½ million sticks in the raw state, to be afterward dressed and mounted, are annually imported into Great Britain. These consist chiefly of the small stems or canes of certain palms, as the Malacca cane, and others called Whangee and Penang Lawyers; the woody stems of some small species of bamboo also are used, besides straight shoots of orange, cinnamon, myrtle, and other shrubs: oak, ash, hazel, sloe, thorn, and other native trees and shrubs, also are used. The preparation and sale of walking sticks are extensively carried on in Hamburg, and the finer sorts are richly and tastefully mounted in Paris.

WALKYRIE—WALL.

WALKYRIE, *wǫl-kǫr'ǿ*, or **VALKYR**, *vǫl'kǫr*: in Scandinavian mythology, one of a company of nine or more beautiful maidens, attendants of Odin (q.v.), who, clad in brilliant armor and adorned with golden ornaments, ride through the air, order battles, and distribute the death-lots according to Odin's commands. Fertilizing dew drops on the ground from the manes of their horses; light streams from the points of their lances, and a flickering brightness announces their arrival in the battle. With their charming glance they rejoice the glazing eye of the hero, and lead him to Walhalla (q.v.), where they act as his cup-bearers. Two Walkyries, Hrist and Mist, are cup-bearers to Odin himself. The name is derived from the Icelandic *Valkyrja*, and means literally 'chooser of the slain,' from *valr*, the 'slain,' and *kjora*, to 'choose.'

They differ in origin: some spring from Elves and other superhuman beings; some are daughters of princes, who in their lifetime are numbered among the Walkyries, showing all their qualities, and when they die their spirits become Walkyries. They ride generally in companies of three, or of three times three or four times three, and have the gift of changing themselves into swans—hence sometimes called swan-maidens. They often choose noble heroes for lovers. Whoever deprives a Walkyrie of her swan-robe gets her into his power. But the song of the Walkyries sounds terrible, as, sitting on a hill, they weave the fateful battle-web. The Walkyries were frequently confounded with the Norns or Destinies. They were conceived also under the figure of the clouds: thus, Hrist signifies 'dark sky,' and Mist signifies 'quaking.' Most of the names of the Walkyries, however, relate to war and battle.—The W. were known also as *battle-maidens*, *shield-maidens*, and *wish-maidens*.

WALL, n. *warol* [AS. *weal*, a wall: Dut. *wal*, a rampart: Ger. *wall*, a bank or dike: all derived from L. *vallum*, the palisade or fortification of a camp—from *vallus*, a stake]: a structure of stone, brick, turf, or other material raised to some height, and serving to inclose or defend a space of ground or buildings; the side of a building; defense; means of protection; in *min.*, the cheeks or sides of a vein: V. to inclose with a wall; to close or fill with a wall; to defend with walls. **WALL'ING**, imp.: N. act of inclosing with a wall; materials for a wall; walls in general. **WALLED**, pp. a. *warold*, fortified or inclosed with a wall. **WALLFLOWER**, fragrant flowering-plant (see below); *colloquially*, a person, particularly a lady, who sits by the wall at a ball or party, and takes no part in the dancing, either from choice, as being unable or unwilling to dance, or from inability to find a partner. **WALL-FRUIT**, fruit growing on trees trained on a wall. **WALL-PAPER**, paper-hangings. **WALL-PLATE**, a piece of timber placed along the top of a wall to receive the ends of the roof-timbers, or so placed as to receive the joists of a floor. **WALL-RUE**, a common fern, the *Asplenium ruta-muraria*. **WALL-SALTPETRE**, a salt occurring in efflorescent silky tufts and coatings of a white or gray color on old walls, in limestone

WALLABA-TREE—WALLACE.

caverns, and on calcareous rocks; also called *nitrocalcite*. To DRIVE TO THE WALL, to push to extremities; to get the mastery over. To GO TO THE WALL, to be hard pressed or driven; to be pushed to one side; to be the weaker party. To TAKE THE WALL, *formerly*, when streets were narrow and ill paved, to take the inner side of a walk, or the side next the wall, as the best and safest place; *hence*, to take precedence.

WALLABA-TREE, *wōl'la-bā-* (*Eperva foliata*). tree of nat. order *Leguminosæ*, sub-order *Cæsalpineæ*, native of Guiana. The wood is deep red, often variegated with whitish streaks, hard, heavy, shining, resinous, and durable.

WALLABOUT, *wōl'a-bowt*, BAY: small arm of the East river, extending into Long Island at Brooklyn, opposite the s.e. corner of Manhattan Island. It is separated from the river by an island, which, with the land bordering on the bay, belongs to the U. S. govt., and is the site of the Brooklyn navy-yard. During the revolution the British prison-ships were stationed in Wallabout Bay.

WALLACE, *wōl'lis*, ALFRED RUSSEL: English traveller and naturalist: b. Usk, in Monmouth, 1822, Jan. 8. He was educated as a land-surveyor and architect; but from 1845 he applied himself to scientific researches. He spent four years on the Amazon, and eight years among the Malay Islands, making extensive zoological collections. While living in the East, unaware of Darwin's cognate researches and speculations, W. formed and committed to writing a theory of development by natural selection, though not using the latter term. Valuable contributions to zoology, botany, and cognate subjects are in his *Travels on the Amazon and Rio Negro* (1853); *Palm Trees of the Amazon* (1853); *The Malay Archipelago* (2d ed. 1869); *Contributions to the Theory of Natural Selection* (1870); *The Geographical Distribution of Animals* (1876), practically founding a new science; *Tropical Nature* (1878); *Island Life* (1880). His recent work *Darwinism* (1889) is a *résumé* more Darwinian than those writers who now are so called, but rejecting sexual selection, and closing with proofs that a spiritual power has intervened to introduce a new element, repeatedly, in the history of life. W. is a believer in spiritualism, and has published works on that subject—among them, *Miracles and Modern Spiritualism*. He accepted, with modifications, the views of Henry George on property in land about 1880, and pub. *Land Nationalization, Its Necessity and Its Aims* (1882); ever since he has been a zealous advocate of the dispossession of the landlords of England and the ownership of the soil by the people or state. Among other works on social questions he has pub. *Forty-five Years of Registration Statistics, proving Vaccination to be both Useless and Dangerous* (1885); *Bad Times, an Essay on the Present Depression of Trade* (1885). Since 1881 W. has had a civil-list pension of \$1,000 a year in recognition of his service to natural science.

WALLACE.

WALLACE, HORACE BINNEY: author: 1817, Feb. 26—1856, Dec. 16; b. Philadelphia. Having graduated at Princeton 1835, he studied medicine, chemistry, and law, but never adopted any profession. He travelled in Europe 1849-50 and 52, everywhere seeking the conversation of philosophical thinkers. He published a novel, *Stanley* (1838); *Art, Scenery, and Philosophy in Europe* (1855); *Literary Criticism, and Other Papers* (1856). He assisted Rufus W. Griswold in preparing his *Napoleon and the Marshals of the Empire*; he was co-editor with J. I. Clark Hare in compiling *American Leading Cases in Law*, and in preparing editions of John W. Smith's *Leading Cases*, and White and Tudor's *Leading Cases in Equity*.—His bro. JOHN WILLIAM W., author (1815, Feb. 17—1884, Jan. 12; b. Philadelphia), was author or compiler of many books of law, and of biographical and historical notices.

WALLACE, LEWIS: soldier and novelist: b. Brookville, Ind., 1827, Apr. 10. He was studying law in Indianapolis when the war against Mexico began, and entered an Indiana regt. as lieut. After the war he practiced law. In the civil war he served first in W. Va. as lieut. col.; was commissioned brig.gen. of vols. 1861; after the capture of Fort Donelson, in which he showed high ability, he was made maj.gen. He rendered efficient service in the battle of Shiloh and in the army movements next following that action, and at Corinth. He was appointed commander of the middle dept. and 8th army corps, with headquarters at Baltimore, Md. 1863; and with a far inferior force stayed the advance of Early, who was marching on Washington at the head of 28,000 men, 1864, July. Gen. Halleck removed W. from his command on account of his misadventure on the Monocacy July 9, but he was honorably reinstated by Gen. Grant. W. was member of the court-martial that tried the assassin of Pres. Lincoln. He was gov. of Utah 1878-81; U. S. minister at Constantinople 1881-85; special envoy to Hayti 1889. He is an exceedingly vivid and interesting writer; and has published *The Fair God* (1873), a novel; *Ben-Hur: a Tale of the Christ* (1880), which has attained an almost unprecedentedly large circulation; *Boyhood of Christ* (1888); *The Prince of India* (1893).—His wife, SUSAN ARNOLD ELSTON W., author (b. Crawfordsville, Ind., 1830, Dec. 25), married Gen. W. 1852. Her writings have commanded much attention. One minor poem by her, *The Patter of Tiny Feet*, is very popular. She has pub. *The Storied Sea* (1884); *Ginevra, or the Old Oak Chest* (1887); *The Land of the Pueblos* (1888); *The Repose in Egypt* (1888).

WAL'LACE, Sir WILLIAM: great Scottish patriot: 1270 (?) -1305, Aug. 23; younger son of a knight, Sir Malcolm W. (as is believed), in s.w. Scotland. Neither the date nor place of his birth has been ascertained. Nothing certain is known of his education or his early years. Blind Harry's half-fabulous poem has indeed inseparably associated his birth with Ellerslie, his boyhood with Dundee, and his youthful manhood with Ayrshire; but his true history, even in the next generation, had become so obscure that it is now impossible to separate truth from falsehood or exaggeration. He appears, in the light of authentic history, first as chief of a band of insurgents (1297) against Edward, King of England. Edward—taking advantage of his superior power, of his influence over the barons of Norman race, then foremost among the nobility of Scotland, and of the position of umpire to which he had been chosen by the various claimants to the Scottish crown—had established his supremacy over the northern kingdom, and afterward deposed John Baliol, and attempted to govern in his own absolute right: see SCOTLAND—*History*. The injustice of the claim, and the cruelty with which it was enforced, roused the opposition of all classes in Scotland except the higher nobles. The gentry and the middle and lower classes of the Lowlands had for many years identified themselves with the country in which they dwelt, rather than with the great English race from which most of them drew their descent; and what has been called the War of Independence began, which resulted in a brief deliverance of Scotland from foreign rule, at the cost of the comparative civilization and tranquillity which the country had enjoyed under the descendants of Malcolm Canmore. That this independence was not made permanent was due to the jealousy of the higher nobles and to their sympathy with the English cause. In this struggle W. was the most successful leader; and in 1297 the insurrection became general. Edward himself was in Flanders; but his general in Scotland, the Earl of Surrey, led his army to Stirling. Sep. 11 they encountered the Scots under W., and were completely defeated. The whole kingdom submitted to W., who, passing the Border, ravaged Cumberland and Northumberland without opposition. On his return from this expedition, he was elected by his countrymen governor of Scotland, in name of King John, whose title was still recognized. In the following year Edward in person entered Scotland at the head of a numerous army. He was met at Falkirk (q.v.) by W. July 23; but the Scots, after an obstinate fight, were defeated. It is generally assumed that the jealousy of some Scottish nobles, who envied the position of the governor, had contributed to the disaster; and W., in consequence, resigned his high office, retiring northward and continuing a predatory warfare against the English. Little is known of his later history, except that he continued to struggle for his country's independence and never made his submission to Edward. It is certain that he was for some time in France. The stories recounted in modern

WALLACE—WALLACHIA.

Lives of Wallace are mostly mere legends. At the close of his life W. emerges from this obscurity. When Edward offered pardon to the other Scottish leaders on certain terms, W. was excepted by name, and a price was set upon his head: if he chose to surrender, his life was to be at the king's mercy. In 1305 he was seized by some of his own countrymen (it is said) and delivered to Edward. He was carried to London and tried for treason. He denied the charge, asserting, with truth, that he had never been the vassal or subject of Edward; but his plea was disregarded. He was condemned; and the sentence of death was executed Aug. 23, with accompaniments of unusual barbarity. —W. was truly a hero: with great physical strength and military prowess, he had also dauntless courage, an unwavering purpose, and a disinterested patriotism. Though he failed in his efforts for his country, his name became an inspiration to Scottish patriots through the long struggle of succeeding centuries.

The chief authority for the Life of W., as told by popular Scotch writers, is the poem of Henry the Minstrel, who lived nearly two centuries after his hero, and whose narrative is a series of picturesque impossibilities. The fullest modern account is by Tytler in *History of Scotland*, vol. I., and in vol. I. of *Scottish Worthies*; but Tytler is to a large extent *Blind Harry* over again, with judicious excisions. All that is really known of W. is in Burton's *History of Scotland*: it corroborates the most favorable estimate of W.'s character.

WALLACE, WILLIAM HARVEY LAMB: soldier: 1821, July 8—1862, Apr. 10; b. Urbana, O. Having moved to Ill. with his family 1832, he entered an Ill. regt. at the opening of the war against Mexico, and took part in many of the principal engagements. He practiced law after his return to Ill., and was dist.-atty. 1853. He was commissioned col. of the 11th Ill. infantry regt. 1861, and by his conduct at Fort Donelson 1862, Feb., won the rank of brig.-gen. At the battle of Shiloh he received a mortal wound after six hours of obstinate fighting.

WALLACE, WILLIAM VINCENT: British musician and operatic composer: 1814, June 1—1865, Oct. 12; b. Waterford; of Scotch parents. He early attained proficiency as a performer on the pianoforte and violin; and was for some years leader of the orchestra of a Dublin theatre. He emigrated to Australia and gave concerts in Australia and New Zealand; and afterward in India and America. In 1845 he went to England and wrote his first opera, *Maritana*, which had immediate success with lovers of Eng. opera, and still holds the stage. After again visiting America, W. composed *Lurline*, which was brought out in London 1860, with even greater success than *Maritana*. He produced other operas; and his works show musical culture and the power of brilliant orchestration. He died in s. France.

WALLA'CHIA, or WALA'CHIA: see ROUMANIA.

WALLACHS—WALLAH.

WALLACHS, n. plu. *wál'láks* [Ger. *wálsch*; AS. *wealh*, foreign—names given by Teutonic nations to foreigners and colonists, and countries inhabited by them]: the natives of Wallachia, the descendants of Roman and other colonists (see **ROUMANIA**: **MOLDAVIA**). **WALLACHIAN**, a. *wál-lá'kí-án*, of or pertaining to: N. an inhabitant or the language of Wallachia. **WALLACHIAN SHEEP**, *Ovis aries*, a sheep remarkable for the development of its horns, which resemble those of the koodoo. The fleece is a soft woolly undercoat, covered with and protected by long drooping hair. This sheep is a native of w. Asia and e. Europe, and is common in Wallachia, Hungary, and Crete: it is sometimes called the Cretan sheep.

WALLACK, *wòl'ák*, **JAMES WILLIAM**: actor: 1794, Aug. 24—1864, Dec. 25; b. Lambeth, England; son of parents who were travelling comedians. He went on the stage in childhood at the Surrey Theatre, London; became stage-manager of Drury Lane Theatre, London, 1824. He first visited the United States 1818, and enacted the rôles of Macbeth, Romeo, Shylock, Coriolanus, Hamlet, and Richmond, with indifferent success. In comedy he was eminently successful, his best performances being in the principal rôles of *The Brigand*, *Rent-day*, *The Wonder*, *Don César de Bazan*, *Wild Oats*. He conducted a theatre in New York 1837, and for several years thereafter; presenting standard plays with well-trained companies. He managed Wallack's Lyceum in New York 1852–61, when he established the old Wallack's Theatre (now the Star Theatre).

WAL'LACK, **JOHN LESTER**: comedian: 1820, Jan. 1—1888, Sep. 6; b. New York; son of James William W. He was educated in England; at the age of 20 entered the Brit. army as lieut., but 2 years later adopted his father's calling, and made his first appearance on the theatrical stage in Dublin. He began an engagement in New York 1847, Sep. 27, playing the part of Sir Chas. Coldstream in one of Boucicault's comedies. For several years thereafter he was employed in various New York theatres, and 1852 joined his father's company as actor and manager: at the elder W.'s death, 1864, Lester W. succeeded to the proprietorship, and conducted Wallack's Theatre till 1881. Then the new Wallack's Theatre was built, and was conducted by W. for some years. On his formal retirement from the stage, 1888, the players of America gave in his honor and for his benefit a performance of *Hamlet*, in which the rôles were enacted by the foremost histrionic artists of the United States: the 'benefit' amounted to \$20,000 net.—Among the rôles in which W. was most successful were those of Don Felix in *The Wonder*; St. Pierre in *The Wife*; Alfred Evelyn in *Money*; Charles Surface in *The School for Scandal*; Young Marlowe in *She Stoops to Conquer*; Harry Dornton in *The Road to Ruin*; Claude Melnotte in *The Lady of Lyons*.

WALLAH, n. *wál'lă* [Hind. *wala*, fellow, man]: a person; a fellow; a man. **COMPETITION WALLAH**, in *India*, a civil servant selected by competitive examination.

WALLA WALLA—WALLENSTEIN.

WALLA WALLA, *wöll'la wöll'la*: city, cap. of Walla Walla co., Wash.; on Mill creek and the Union Pacific railroad; 6 m. from Walla Walla river, 30 m. from Columbia river, about 410 m. e.-by-s. of Olympia; in the centre of a valley noted for farm, fruit, garden, and pasture land. It has a constant water-power the yearround, water-works, gas and electric light plants, street railroads, co. courthouse (cost \$100,000), city-hall (\$25,000), opera-house, public library, Whitman College, St. Vincent's Acad. for girls (Rom. Cath.), St. Paul's School for girls (Prot. Episc.) Y. M. C. A. building, business coll., 13 churches (Cong., Episc., Rom. Cath., Meth. Episc., Bapt., Presb., Christian, German Lutheran, Adventist, and United Brethren), 4 public halls, and 4 public-school buildings. Just beyond the city limits are the grounds and racing-track of the Agricultural Soc.; $\frac{1}{2}$ m. s.w. is Fort Walla Walla, a U. S. milit. reserve; and 1 m. n.w. is the state penitentiary. The industries include flour-mills run by water-power, steam agricultural works, steam fruit-cannery, breweries, tannery, furniture factories, foundry and iron-works, chop-mills, soap-factory and minor works. There are 2 nat. banks (cap. \$250,000), 2 savings banks (cap. \$190,000), 1 state bank (cap. \$50,000), 1 loan and trust co. (cap. \$200,000), and 2 daily and 4 weekly newspapers. Pop. (1880) 3,588; (1890) 4,709; (1900) 10,049.

WALLENSTEIN, *wöll'len-stîn* (correctly WALDSTEIN, *vält'stîn*), ADALBERT-WENCESLAS-EUSEBIUS VON, Duke of Friedland, Sagan, and Mecklenburg: the most remarkable of the long series of men prominent in the Thirty Years' War (q.v.): 1583, Sep. 15—1634, Feb. 25; b. at the château of Hermancè, in Bohemia; third son of a noble family. His parents, who were Protestants, intrusted his education to the Moravian brotherhood of Koschumberg, who, however, made little of their stubborn and passionate pupil. On his parents' death, his uncle, Albert Slavata, a zealous Rom. Catholic, took charge of the wayward youth, and, having won him over to his own creed, sent him to the Jesuit *convictorium* at Olmütz, and to the universities of Altorf, Bologna, and Padua, where his education, such as it was, was completed. W.'s course of training had not eradicated, nor even moderated, the prominent faults in his natural disposition; rather, his wilfulness and independent spirit had gathered strength from ineffective opposition; and his first prominent appearance in affairs showed a man of extreme individuality, with great and versatile ability, but with equal obstinacy, passion, and pride. He visited Germany, France, and Holland; took service in the imperial army against the Turks in Hungary; and, returning home at the close of the war (1606), married a widow of noble rank, who, at her death (1614), left him all her great wealth. This, along with the 14 domains bequeathed to him by his uncle, made him one of the richest lords of Bohemia—a position recognized by the imperial court in the bestowal on him of the title of count and the military grade of colonel. A second marriage 1617 with the daughter of Count Harrach, the emperor's favorite; with W.'s firm ad-

herence to the imperial side during the Bohemian insurrection—his maintenance at his own expense of a large body of troops, and his brilliant and well-directed bravery at the battle of Prague and in contests with Mansfeld and Bethlem Gabor, added a powerful influence at court to his previously local eminence. The latter was now much increased by his purchase, at much less than their value, of 60 confiscated lordships in Bohemia; and Ferdinand II. felt himself impelled to recompense the valuable services of his faithful subject by (1623) raising him to the dignity of a prince of the empire, with the title *Duke of Friedland* (Friedland is a town close to the Prussian frontier, about 60 m. n.n.e. of Prague). Two years later, when the impossibility of maintaining an army sufficient to restrain the Prot. League from uniting with the Danes threw the emperor almost into despair, W.—seizing such a favorable opportunity of gratifying his ambition—offered to raise, equip, and maintain 50,000 men free of charge, provided he were intrusted with the absolute command, and allowed to appoint his own officers—a proposal readily accepted by the emperor. W. raised 30,000 in Bohemia; adventurers from all quarters flocked to his standard; and soon his army exceeded the promised number. With this motley but not ill-disciplined array, he marched into n. Germany, and, acting in concert with Tilly (q.v.), routed Mansfeld at Dessau, hunted him through Silesia and Moravia, and on his junction with the army of Bethlem Gabor, in Hungary, compelled, by skilful strategy, the combined forces to remain on the defensive. Released by a truce with the Transylvanian prince and the death of Mansfeld, W. returned by Silesia, recovered the fortresses which Thurn had captured, forced the Elector of Brandenburg to submit to the emperor, and joined Tilly in annihilating the military power of Denmark. The value of these services to the emperor's cause was inestimable, as Ferdinand well knew; accordingly he turned a deaf ear to the loud complaints of the North Germans, who had suffered grievously from the rapacity, oppression, and license which W. freely allowed his soldiers to exercise; and he rewarded their leader by the gift of the Mecklenburg duchies, the rank of generalissimo on land, and admiral of the Baltic. W. speedily made himself master of his new territory; fitted out a fleet of 15 sail, by the aid of which he captured Usedom and Rugen, with various Baltic ports, and laid siege to Stralsund. But the Danes annihilated his navy; and the Swedes succored Stralsund, whose siege he was compelled to abandon. But since, under cover of the dread inspired by W.'s arms, Ferdinand had resumed his tyrannical and aggressive schemes (see THIRTY YEARS' WAR) in Germany, the Rom. Cath. League, headed by the Duke of Bavaria, became bitter adversaries of W.; and, backed by the intrigues of France (which was represented at Vienna by Father Joseph, a master of subtle and unscrupulous diplomacy), partly forced and partly cajoled the emperor to dismiss W.—an act for whose probable consequences even Ferdinand, with his extraordinary fortitude, trembled. W., however, dis-

appointed his sovereign's fears and his enemies' hopes by accepting his dismissal with apparent cheerfulness, being somewhat moved thereto by the predictions of his favorite astrologer (W., through all his life, was much influenced by this pseudo science), who declared his star to be only temporarily eclipsed, and that it would soon shine forth again with far greater lustre: he retired to Prague, where he lived in his magnificent palace in sovereign state, surrounded by a court of barons, knights, and the principal officers of his army. But the insult and injury that he had received were eating into his soul; the frankness and affability to his subordinates, which had hitherto distinguished him, were changed for gloomy taciturnity; and much of his time was spent in solitude, brooding over his wrongs, and scheming for revenge on the Duke of Bavaria, to whom he justly attributed his disgrace; though all the while he kept a calm but eager watch over the changes of opinion in the court of Vienna, where several of the ministers and numerous secret agents were either in his pay or devoted to his interests. His eminent services, his immense popularity, and his great talents pointed him out as the only hope of the empire after Tilly's death; and, with the advent of Gustavus Adolphus on the field of arms, Ferdinand saw himself forced almost to kneel to his haughty subject, and beseech him again to gird on his sword. W. for a long time affected indifference to re-engaging in active service, and at last consented only on such conditions as made him the independent ruler of the empire in military affairs. With the Swedes on the Danube, the Saxons in Bohemia, and the army of the League almost annihilated, the emperor saw no other course; and W., three months afterward, was at the head of 40,000 men, well armed and disciplined. But commands and entreaties were in vain employed to induce him to save Bavaria from the Swedes; and he lay idle at Leitmeritz, gloating over the pangs of his enemy the duke, till, Austria being threatened, he advanced to Eger, and, by menacing at once Saxony and Nuremberg, brought Gustavus Adolphus to a standstill. The two armies lay opposite each other ten weeks, each suffering famine, hardship, and sickness, in the hope of wearying out the other. At last, when half their numbers had succumbed, Gustavus Adolphus, who had made a fruitless attempt to storm W.'s camp, retreated to the Danube, whence his skilful opponent soon drew him by marching on Saxony. The two again confronted each other at Lutzen (q.v.); and though W. was completely defeated, it was chiefly owing to the superior discipline and *morale* of his opponents. His army was recruited and reorganized in Bohemia; and, unable to make head against Saxons and Swedes combined, he found it advisable to gain time by amusing his antagonists with illusory negotiations, after repeated vain endeavors to persuade the emperor to come to terms with the Prot. princes. Indeed, W. seems to have formed a great plan for the combined pacification of Germany and aggrandizement of himself, and entered into negotiations thereto with Sax-

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ony, Brandenburg, Sweden, and France. These overtures many writers have seen reason to regard as mere ruses of war to divide the counsels of the emperor's enemies. Meantime his own old enemies of the League were in full activity at Vienna; and the emperor, chagrined at the humiliations to which he had subjected himself to gain W.'s aid, was not slow to give credit to their representations: his ill-concealed dislike was developed into hatred by the stubborn pertinacity with which W. insisted on the full observance of the terms of their agreement; and when W., who was kept informed of the state of matters at court, attempted to attach his officers permanently to himself by obtaining their signatures (1634, Jan. 12) to an agreement to that effect, the emperor (Jan. 24) signed a secret order removing him from his command and requiring the army to give obedience to Count Gallos. A second order, Feb. 18, declared W. guilty of treason. W., with some devoted adherents, including a guard of 200 dragoons, took refuge in Eger, hoping for protection from the Prot. gen. Bernhard. There he was assassinated by some officers who had combined to rid the emperor of his enemy. It is not known that the murder was by orders from the emperor; but it was understood that tidings of it would be welcome at court; and in fact the murderers were rewarded and commended as for an act of irregular but necessary justice.—W. was tall, thin, and wiry, with brilliant eyes, tawny-reddish hair, and yellow complexion. As a general he holds the foremost rank—vigilance and presence of mind, great judgment and unflinching perseverance, being his prominent characteristics; and of him alone can it be said that he checked the progress and foiled the designs of the great hero of Sweden. After his death a paper was published by imperial authority, in which an attempt was made to show that he had constantly meditated treason from the time of his first disgrace. This view and its opposite have found numerous and earnest supporters. Of a series of proofs adduced in support of W.'s honesty of purpose in his secret negotiations, we adduce only this—that when, after he had been declared a rebel, he *did* make 'treasonable' overtures to Bernhard of Weimar, that general, though W.'s defection would at that time have been of the utmost importance, could not convince himself that this was not another artifice—a proof that the former overtures were as above stated.—See Coxe's *House of Austria*; Harte's *History of the Life of Gustavus Adolphus* (1759); Pelzel's *Geschichte der Böhmen* (Prague 1774, 79, 82); W.'s *Briefe* (ed. by Forster 1826); Ranke's *Geschichte W.'s* (1869); Gindely, *Neues über W.* (1876); articles by Hallwich in *Archiv für Sächs. Gesch.* (1876), and by Lorenz in *Sybel's Historische Zeitschrift* (1878).

WALLER, wôl'ér, EDMUND: one of the refiners of English poetry: 1605, Mar. 3—1687, Oct. 21; b. Coleshill, Herts; of ancient and opulent family. He passed through Eton and King's College, Cambridge, and was returned to parliament, at the early age of 18, as member for Amer-sham, Bucks. In 1631 he married a London heiress, who

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died shortly afterward; and the rich widower made suit to Lady Dorothy Sidney, eldest daughter of the Earl of Leicester, whom he poetically and perseveringly commemorated under the name Saccharissa. Lady Dorothy, however, was inexorable: 'she was not to be subdued,' as Johnson says, 'by the powers of verse.' Meeting him in her old age, she asked the poet when he would again write verses upon her; and he ungallantly replied: 'When you are as young, madam, and as handsome as you were then.' In the Long Parliament, W. joined the party of Hampden (his cousin), and he was one of the commissioners appointed to negotiate with King Charles I. at Oxford 1643. He was soon gained over by the royalists, and entered into a conspiracy against the dominant party in the house of commons, for which he was fined £10,000, and banished the kingdom. His conduct on this occasion was mean and disgraceful. He confessed not only all that he knew, but also all that he suspected; attempted to criminate innocent persons, and humbled himself before the house of commons in abject language. After eight years' exile in France and Italy, he was suffered to return to England; and he then became a supporter of the Commonwealth and a panegyrist of Cromwell, with whom he was connected by marriage. When Charles II. was restored, W. was equally ready with a poetical congratulation; but his loyal strains were much inferior to those with which he had hailed the Protector; and it is said that when Charles reminded him of this fact the poet wittily replied: 'Poets, sir, succeed better in fiction than in truth.' Till his 80th year W. continued a member of the house of commons, delighting all parties by his wit and vivacity. He died at Beaconsfield.—W. began verse-writing early, and published two collections of his poems (1645, 64). An ed. appeared 1711, edited by Atterbury; and one in 1729, with copious 'Observations' by Fenton. Pope has eulogized the *sweetness* of W.'s verse. Some of his smaller pieces are characterized by rare grace and harmony; he has also occasional dignity and striking imagery, as in his lines on Cromwell; and he is never involved or obscure; yet his rank among English poets is subordinate, as he is deficient in passion, energy, and creative power. He was best in complimentary verse.

WALLER, JOHN LIGHTFOOT, LL.D.: Baptist minister: 1809, Nov. 23—1854, Oct. 10; b. Woodford co., Ky. After several years as a teacher, he became editor of the *Baptist Banner* 1835, and when that journal was merged in the *Western Pioneer* he continued editor. He was ordained to the ministry 1840, and was for a time pastor of a Bapt. chh. He founded (1845) the *Western Baptist Review*, afterward called *Christian Repository*, and edited it till his death. He was member of the Ky. constitutional convention 1849.

WALLER—WALLFLOWER.

WALLER, THOMAS McDONALD: politician: b. New York, about 1849. Being an orphan newsboy in New York, he was adopted into the family of a resident of New London, Conn., and assumed the family name instead of his own surname Armstrong. He studied law, was admitted to the Conn. bar 1861, and quickly reached high rank as an advocate. He was elected as democrat to the Conn. legislature 1867-8, 1872, 76, and in his last term was speaker of the house. He was Conn. sec. of state 1870; mayor of New London 1873; state atty. 1876-83; gov. 1882. He was U. S. consul-gen. at London 1885-89. He then returned to the practice of law in New London.

WALLET, n. *wōl lēt* [according to Skeat, the same word as *wattle*, in the sense of a fleshy bag or excrescence]: a bag for carrying necessities on a journey; a knapsack; anything protuberant and swagging.

WALLEY, *wōl īi*. **JOHN:** soldier: 1644-1712, Jan. 11; b. presumably in London, England. He commanded, 1689, Feb. 12, the first expedition against the French and Indians in Canada; and 1690, Aug., as lieut. of Sir Wm. Phips, he sailed on a second expedition, landed at Quebec with 1,200 men, and, after a vigorous but unsuccessful bombardment of the place, returned to Boston. He was capt. of the Ancient and Honorable Artillery Co. of Boston. His journal of his Canadian expeditions is in Thomas Hutchinson's *History of Massachusetts*.

WALL-EYE, n. *warōl'ī* [Icel. *vagl-eygr*, wall-eyed, said of a horse: Icel. *vagl*, a beam in the eye; Sw. *wagel*, a sty in the eyelid (and see EYE)]: an eye of a whitish color; the popular name of the disease of the eye called *Glaucoma* (q.v.). **WALL-EYED**, a. *-īd*, having an eye of a very light-gray or whitish color—generally applied to horses; hence, fierce or glaring.

WALLFLOWER: plant of the genus *Cheiranthus*, nat. order *Cruciferae*, having the siliques quadrangular from the prominence of the nerves on the back of the valves, seeds in a single row in each cell, stigma deeply 2-lobed, lobes bent back, flowers in racemes. The species are annual, biennial, or perennial herbaceous plants, some almost shrubs. The COMMON W. (*C. cheiri*) is found in rocky places and on old walls in s. Europe, also less abundantly in middle Europe and in Britain. It does not thrive so well in this country as in England, as it delights in a moist atmosphere. In its wild state its flowers are always yellow; but in cultivation they exhibit diversity of colors, chiefly brown, purple, and variegated; and they attain a larger size. It is a universal favorite, for the delicious odor of its flowers, produced from Apr. to July. The varieties in cultivation are very numerous; but there are among them no marked distinctions. Double and semi-double flowers are frequent. The plant is perennial, but in gardens is generally treated as a biennial, though fine kinds are propagated by cuttings, which soon strike root under a hand-glass. The ordinary mode of cultivation is to sow the seed of an approved kind, and to plant

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cut the seedlings. The flowers of W. have a bitter and cress-like taste, and were formerly used as medicine.—The Fairy W., Western W., etc., of some parts of the United States, are of a quite different genus, *Erysimum*.

WALLINGFORD, *wōl'ling-fērd*: borough in New Haven co., Conn.; on the Quinnepiac river, and on the New York New Haven and Hartford railroad; 12 m. n.e. of New Haven. It contains a town hall, high school, 4 churches, summer hotel, and manufactories of britannia and silver ware, machinery, and books. A branch of the Oneida Community (see **PERFECTIONISTS**), known as the Wallingford Community, is located here, and is prosperous. There are 1 national bank (cap. \$150,000), 1 savings bank, and 1 weekly newspaper.—Pop. (1880) 3,017; (1890) 4,230; (1900) 6,737.

WALLINGFORD, *wōl'ling-fērd*: small market-town of England, mostly in the county of Berks, and on the right bank of the Thames, 13 m. n.w. of Reading. Of its three churches, that of St. Leonard's—rebuilt 1849—has a Norman doorway. The earthworks with which the Romans encompassed the town, are still distinctly traceable. The diversion of the London and Oxford road from W. injured the old town, and it is now a place of little consequence, though of some interest from its antiquity.—Pop. (1871) municipal borough 2,972; (1901) 3,000.

WALLIS, *wōl'lis*, **JOHN**. D.D.: eminent mathematician, a clergyman of the English Church: 1616, Nov. 23—1703, Oct. 28; b. Ashford, Kent; eldest son of the Rev. John Wallis, incumbent of Ashford. He was educated for the ministry, with strict exclusion (according to the practice prevalent in his time, but in his case made extreme) of other branches of knowledge, even of ordinary arithmetic. W. never saw a book of arithmetic till he was 15 years old, and then only by accident. At the age of 16 he was entered at Emmanuel College, Cambridge, where mathematics found no place in the course of study, being esteemed merely mechanical. After a brilliant career he took his degree, was chosen a fellow of Queen's, and took orders 1640. On the outbreak of the civil war he sided with the parliament, and was of great use to his party in deciphering intercepted royalist correspondence—an art in which, like Vieta (q.v.) and Battista la Porta, he was eminent. In 1644 he was one of the secretaries of the Assembly of Divines at Westminster, holding at that time the living of St. Gabriel, Fenchurch street, London; and in the following year he joined with other eminent men in establishing the meetings for mutual instruction which, 17 years afterward, developed into the Royal Soc. In 1647 he began the study of mathematics; 1649 he was chosen Savilian prof. of geometry at Oxford. His rapid progress was evidenced by the publication 1655 of his greatest work, *Arithmetica Infinitorum*, with treatise on Conic Sections prefixed. In the same year began his well-known controversy with Hobbes—regarding a quadrature of the circle, which the latter believed he had effected—continued at intervals till 1663, and marked by

the usual quaint caustic satire of the time. W. had, of course, the right side of the dispute; but, unfortunately for posterity, his magnanimous forbearance toward a deceased antagonist (Hobbes died 1679) prevented him from admitting his polemical treatises into the collection of his works 1693-99. Among his many mathematical works were: *Mathesis Universalis* (1657); *Commercium Epistolicum* (1658); *Cuno-Cuneus* (1663); *De Proportionibus* (1663); *De Aestu Maris* (1668); a treatise on Mechanics (1669, 70, 71); editions of the works of Horrocks (1673), of the Arenarius and Quadrature of Archimedes (1676), and of Ptolemy's Harmonics (1680); treatise on Algebra (1685); ed. of Aristarchus and of Pappus (1688), etc. He wrote also numerous minor theological works, polemical and expository. Of his other works, the treatise on Logic (1687) is of high excellence; and his English Grammar (1653), written in Latin for the use of foreigners, has only of recent years, in the truer development of the principles of grammar, received the attention that it merits. W.—who, 1648, though a parliamentary adherent, had opposed putting Charles I. to death—joined about 1658 the party favoring restoration of kingly government. At the Restoration he was confirmed in his professorship, was appointed keeper of the archives at Oxford, and royal chaplain. He seems, however, to have retained moderate and rational views in ecclesiastical matters.

W.'s fame as mathematician has thrown into shade his services as a scholar; and few now know that it was he who first edited the musical works of Ptolemy, Porphyrius, Aristarchus of Samos, and the later work of Brienius; though these and other labors show high scholarship and an acute and philosophic mind. His *Arithmetica Infinitorum* is a successful attempt to solve, by means of the summation of series to infinity, a number of the more simple problems of the calculus, such as the evaluation of all cases of $\int x^m dx$; and, in extension, to discover the limit of $\int (a^2 - x^2)^n dx$, of which the quadrature of the circle is a particular case. There are numerous other results, now considered to belong to the more advanced stages of the calculus; and, in fact, W. is another example of the strange blindness which, in full possession of a principle, neglects to suit it with a generalized form of expression. The best known of W.'s results is his formula for π , which gives

$$\frac{\pi}{4} = \frac{2 \cdot 4 \cdot 4 \cdot 6 \cdot 6 \cdot 8 \dots}{3 \cdot 3 \cdot 5 \cdot 5 \cdot 7 \cdot 7 \dots} \text{ ad infinitum.}$$

WALLIS, SEVERN TEACKLE: lawyer: b. Baltimore, Md., 1816, Sep. 8. He graduated at St. Mary's Coll., Baltimore, 1832, and began the practice of law 1837. At this time he contributed to periodicals articles on literary and historical criticism and some verses, and made a study of Spanish literature. He was member of the Md. house of delegates 1861, and as chairman of the committee on federal relations became obnoxious to the federal authority at Washington, as one acting in the secession interest; and

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was arrested and kept in prison 14 months. He was elected provost of the Univ. of Md. 1870. W. has published two books on Spain and numerous pamphlets.

WALLOON, n. *wāl-lón'* [from same root as *Wallachs*]: one of that section of the inhabitants of Belgium and the adjoining districts in the s.e. who are of Gallic descent, speak a Romance dialect of French, and are of darker complexion than their Flemish neighbors, who are of Teutonic descent and constitute the other great section of the population of Belgium; also the language spoken in that district: ADJ. of or pert. to the Walloons.—The *Walloons* belong to the great Romanic family, especially to the French stock, and are located more particularly in the Ardennes, in parts of the depts. of Pas-de-Calais, Nord, Aisne, and Ardennes in France, but chiefly in South Brabant, as well as in the provinces of Hainault, Namur, Liège, in Belgium, and in the greater part of Luxemburg, and finally in some towns and villages in the neighborhood of Malmedy, in Rhenish Prussia. The W. are descendants of the old Gallic Belgæ, who held their ground among the Ardennes Mts. when the rest of Gaul was overrun by the German conquerors, but eventually became Romanized, especially in their language, which appears now as a patois or popular dialect of French: of all the French dialects, it preserves the greatest number of Gallic words: see Grandgagnage, *Dictionnaire Étymologique de la Langue Wallonne* (continued by Scheler, 1847-50).—The Walloon Protestants were a branch of the French Calvinists who settled in the Netherlands at the revocation of the Edict of Nantes 1685.—The name W., in Dutch *Walen*, shows their Gallo-Romanic origin and their relationship, partly by race and partly by language, with the Galli, Gaels, Walese, Welsh, Walachians, etc. The W. of the present day resemble their French more than they do their German neighbors. They are middle-sized, with powerful limbs, dark hair, deep-sunk, fiery, dark-brown or blue eyes. They surpass their Flemish neighbors in adroitness, activity, and skill; and their French neighbors in earnestness, perseverance, and diligence. In impulsiveness they resemble the latter more than the former, but their anger cools sooner than that of the more deeply feeling Fleming. The Belgian revolution was pre-eminently the work of the Walloon districts, and the most eminent statesmen of modern Belgium are of Walloon descent. It was chiefly against the Walloon spirit and tendencies that the Flemish movement was directed (see FLEMISH LANGUAGE AND LITERATURE).—The W. numbered (1886) 2,780,000.

WALLOP, v. *wōl'lop* [Norm. F. *vloper*, to thresh: Swiss *valple*, to sway to and fro, to waddle: Low Ger. *wallen*, to boil: *gallop* is the same word]: to move to and fro, as the surface of water in a vessel that has been rapidly moved; to boil; to gallop; to give a beating to. WAL'LOPING, imp. WAL'LOPED, pp. *-lōpt*. WAL'LOPER, n. *-ēr*, one who wallops.

WALLOW—WALL-TREES.

WALLOW, v. *wōl'lō* [akin to *wallop*: AS. *wealwian*, to roll: Dut. *wallen*, to boil, to bubble: Swiss, *wallen*, to roll: L. *volvērē*, to roll]: to roll one's body among mire or other filthy matter; to tumble and roll about in water; hence, to live in a gross state, as in vice. **WALLOWING**, imp. **WALLOWED**, pp. *-lōd*. **WALLOWER**, n. *-ēr*, one who wallows.

WALL'PIECE: small cannon (or, in ancient times, an arquebus) mounted on a swivel, on the wall of a fortress, for firing at short range on assailants in the ditch or on the covert-way.

WALLSEND, *wəʊlz'ēnd*: parish of the county of Northumberland, England; 4 m. e.n.e. of Newcastle, at the e. extremity of the Roman Wall, erected by Agricola 79 from the Solway to the Tyne, renewed and strengthened by Adrian 121 and Severus 208; notable for its collieries, which produce a very large quantity of superior coal, of which about 2,000,000 tons are annually sent to London.

WALL'-TREES: fruit-trees trained on walls for better exposure of the fruit to sunshine, and for sake of the heat radiated from the wall. Brick walls are preferred, and have a great advantage in the regularity with which the nailing can be accomplished; but trees are often trained on stone walls also, and sometimes on the walls of houses. Trees are trained on walls in hot houses as well as in the open air. Flued walls are often used, the fruit being thus partially forced by artificial heat; and screens of various kinds, as of reeds, canvas, and oiled paper, are sometimes employed to protect blossoms in spring. Woolen nets also are much used for this purpose, and a net even with wide meshes affords much protection from spring frosts. **W.-T.** intended to occupy the wall permanently are generally trained in the nursery with a dwarf stem only five or six inches in length, so that the branches may cover the whole wall, and no available part of it be lost. It is usual, however, in planting to introduce *riders* alternately with the permanent **W.-T.**: the riders are grafted or budded on tall stocks, and occupy part of the wall till the **W.-T.** have become large enough to require it all. The chief modes of training **W.-T.** are known as *fan training* and *horizontal training*. In fan training the branches are arranged like the spokes of a fan; in horizontal training a main stem is led up, from which they are spread out horizontally on both sides. Different modes are preferred for different kinds of trees, and the art of the gardener is shown in keeping to his plan of training, and *laying in* branches so as to fill the space and make every part of the wall productive. There is a Dutch mode of training, which consists in leading two chief branches horizontally right and left, and training shoots from them straight up to the top of the wall. Riders are trained frequently in a star-like form, some branches being led downward, to fill the wall as quickly as possible. It is necessary for the gardener, in training **W.-T.**, to consider the habit of each kind, particularly whether fruit is to be expected chiefly on young branches or on the *spurs* of older branches. Super-

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fluous branches must in all cases be carefully removed, and among these are to be reckoned all *fore-right shoots*, or branches which project straight from the wall.

WALNUT, n. *wawol'nūt* [AS. *wealh*, foreign, and *hnut*, a nut: Dut. *walnoot*, a walnut: Icel. *valhnót*; Dan. *valnød*]: tree of several species, native of Persia, whose wood is used in cabinet-work; also its nut. WALNUT-OIL, one of the oils used in painting, obtained from the fruit of the walnut.—The *Walnut* is a beautiful tree of the genus *Juglans*, nat. order *Juglandaceæ*. This order is nearly allied to *Cupuliferae* (q.v.), but differs in having a solitary erect ovule. The flowers are unisexual, the male flowers in catkins, the female in terminal clusters. The species, of which not quite 30 are known, are natives mostly of N. America; a few are found in Asia. All are trees with alternate pinnated leaves. The genus *Juglans* is distinguished by a drupe with a fibrous-fleshy indehiscent husk, and a deeply wrinkled shell (*putamen*) of two valves, within which is the seed, curiously lobed and wrinkled, with a membranaceous *testa* and partial dissepiments. The species of Hickory (q.v.) were formerly included in this genus.—The COMMON W. (*J. regia*) is a native of Persia and the Himalaya, but has long been cultivated in all parts of s. Europe. The date of its introduction is unknown, but it was certainly cultivated by the Romans in the reign of Tiberius. It is a lofty tree of 60–90 ft., with large spreading branches. Its foliage resembles that of the ash. The leaves have 2–4 pair of leaflets and a terminal one. They have a fine balsamic odor when bruised; this quality, however, being much more marked in some trees than in others. Placed in wardrobes, they prevent the ravages of moths. The sap is limpid like water, but contains much sugar, so that the tree is sometimes tapped for it, like the sugar-maple, and the sugar is procured by evaporation. A pleasant kind of wine also is made from it. An excellent pickle and a kind of catchup are made of the unripe fruit. The ripe fruit is one of the best of nuts, and is an important article of export from many parts of s. Europe. Walnuts are exported in large quantities from Cashmere and other Himalayan regions to supply the markets of India. The outer husk is removed before the nuts are brought to market. In s. Europe, walnuts are a considerable article of food; and when perfectly fresh they are wholesome and nutritious, though in the state in which they are exported to other countries they are not easily digestible. Just before they are ripe they are much used in France with vinegar, salt, pepper, and shallots. Among varieties of W. in cultivation is one with a very thin shell, which is much esteemed. Walnuts yield by expression a bland fixed oil, which, under the names *Walnut Oil* and *Nut Oil*, is much used by painters, and in the countries in which it is produced is a common article of food. The *cake* left after the expression of the oil is sometimes used as food, and is used also for feeding cattle and poultry. The timber of the W. is of great value, and is much used by cabinet-makers. Gun-stocks are made of it. It is light,

though hard and fine-grained. The wood of young trees is white and little esteemed; that of old trees is brown, veined and shaded with darker brown and black. The wood of the roots is beautifully veined. Both the root and the husks of the W. yield a dye used for staining light-colored woods brown. The W., when meant to become a timber-tree, is best sown where it is to remain, as the roots are much injured by transplanting. The best kinds of W. for fruit are generally grafted.—The W. was probably introduced into England by the Romans. It takes its name from being foreign [AS. *wealh* or *walk*].—Of late years it has been largely planted in California. Very similar to the Common W. is the BLACK W. (*J. nigra*) of N. America, found in most parts of the United States, except the most northern. It abounded in the states of the Mississippi valley, but was recklessly cut down for every purpose—railway ties, common boards, and even cow-sheds. Now it brings a high price for cabinet-work, and much is sent east and even exported. It is a very large and beautiful tree, the trunk sometimes 6 or 7 ft. in diameter. The leaves have more numerous leaflets than those of the Common W. The fruit, however, is very inferior. The partial dissepiments of the kernel are thick and woody.—The BUTTERNUT (*J. cinerea*) is abundant in the n. and n.w. states of N. America and in Canada. It is a tree about 50 ft. high, with trunk about 12 in. in diameter; leaves with 15–17 leaflets; the fruit elongated, and externally covered with a viscid substance. The nut is hard and rough, with prominent ridges; is of good quality, and sometimes brought to market. The wood is not apt to split or warp, and is useful for many purposes. Sugar is obtained from the sap, as from that of the maple, but it is of inferior quality. The inner bark is a mild cathartic, resembling rhubarb in its properties. The leaves, reduced to powder, are used for blistering, like cantharides.—To the nat. order *Juglandaceæ* belongs the genus *Engelhardtia*, found in the Malayan Archipelago and the Himalaya. The wood of *E. Roxburghiana*, a Himalayan species, is much valued by turners.

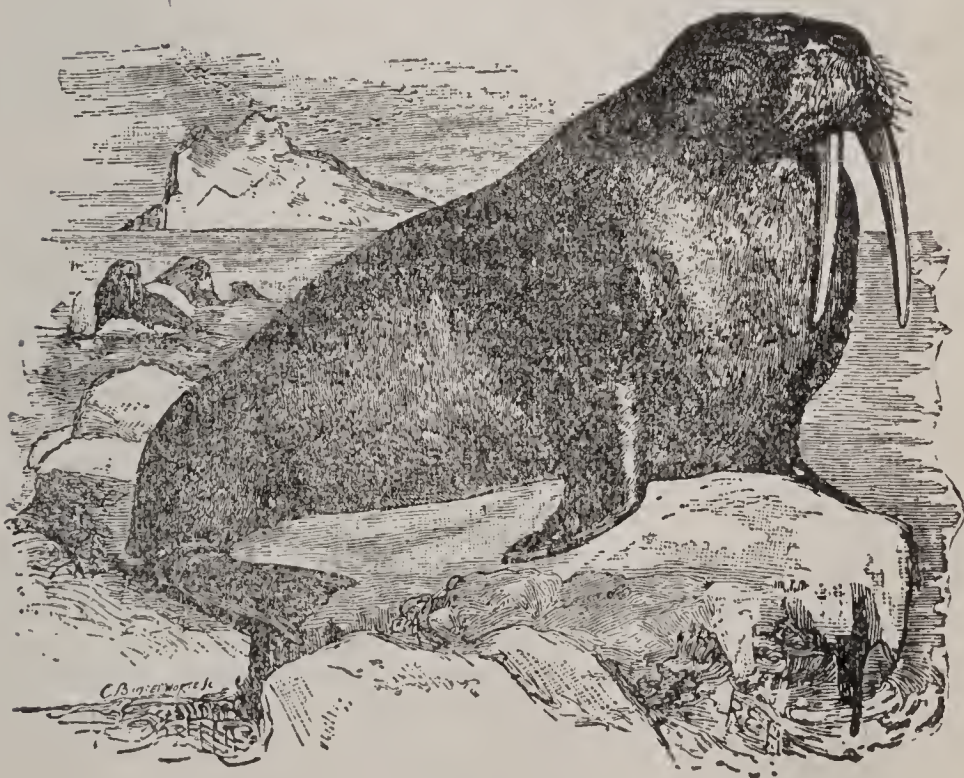
WALPOLE, *wŏl'pŏl*, HORACE, fourth Earl of Orford: 1717, Sep. 24—1797, Mar. 2; son of Sir Robert W., first Earl of Orford. There has been, among scandal-mongers of subsequent times, a different account of his parentage, but seemingly without evidence. He was educated at Eton and Cambridge. After finishing his education, he travelled abroad for some years, principally in Italy, where he seems to have acquired those tastes for which he afterward became so well known. In 1741 he returned to England and took his seat in parliament. But he had no taste for politics, and never took active part in public life. In 1747 he purchased a piece of ground, with a villa, near Twickenham, on the banks of the Thames. Here he built his famous Gothic mansion—Strawberry Hill. Its erection and decoration formed one of the principal occupations of his long life. He made it a museum of every kind of curiosities. In 1758 he published his *Catalogue*

of *Royal and Noble Authors*. This was followed by *The Castle of Otranto*, *The Mysterious Mother*, and the *Historic Doubts on the Life and Reign of Richard III.* The works, however, which preserve his name are his *Letters*: these will always be interesting as pictures and records of the society and fashionable gossip of his day, though their interest is marred by their palpable lack of truthfulness. On the death of his nephew, 1791, he became fourth Earl of Orford. 'The faults of Horace Walpole's head and heart,' says Macaulay, 'are indeed sufficiently glaring. His writings, it is true, rank as high among the delicacies of intellectual epicures as the Strasburg pie among the dishes described in the *Almanach des Gourmands*. But as the *pâté de foie gras* owes its excellence to the diseases of the wretched animal which furnishes it, and would be good for nothing if it were not made of livers preternaturally swollen, so none but an unhealthy and disorganized mind could have produced such literary luxuries as the works of Walpole. . . . The conformation of his mind was such that whatever was little seemed to him great, and whatever was great seemed to him little. Serious business was a trifle to him, and trifles were his serious business.'—See *Letters*, ed. by Cunningham (8 vols. 1857); Macaulay's Essay; *Horace Walpole and His World*, by L. B. Seeley (1883).

WALPOLE, Sir ROBERT, Earl of Orford: prime minister of England: 1676, Aug. 26—1745, Mar. 18; b. Houghton, in Norfolk; son of Robert W., M.P. He received his education at Eton and at King's College, Cambridge. 1700, July 30, he married Catharine, daughter of Sir John Shorter, lord mayor of London; and Nov. 28 he succeeded to the family estates on the death of his father. In 1702 he was elected member of parliament for King's Lynn; and 1705 he was nominated one of the council to Prince George of Denmark. In this latter capacity he appears to have won the esteem of Godolphin, Marlborough, and other whig leaders. In 1707 he was appointed sec. at war, and 1709 treasurer of the navy. Shortly after this, however, his fortunes suffered temporary eclipse. He was found guilty by the house of commons of 'a high breach of trust and notorious corruption,' and accordingly, 1712, Jan. 17, he was expelled the house, and sent to the Tower. There can be little doubt that he was not much troubled by scruples in regard to bribery; but his punishment on this occasion seems to have been the result of party animosity. Instead of working his loss of popular favor, it ultimately augmented it. He had all along been a strong Hanoverian, and on the accession of George I. he was restored to fortune. He was made a privy councilor, and had various other high offices conferred on him. On the impeachment of Bolingbroke and others by his means, he became, 1715, chancellor of the exchequer and first lord of the treasury. A disunion of the cabinet having arisen 1717, he resigned office, bringing in a sinking-fund bill on the day of his resignation. In opposition, he was the determined enemy of the South Sea Scheme. He was



King Vulture.



Walrus.

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recalled to office on the retirement of the Earl of Sunderland 1721; and from this time to his final retirement 1742, the life of W. may be said to be the history of England. In 1723 his son was created Baron W. In 1737 his power was much shaken by the disputes between the king and the Prince of Wales; the latter siding with the opposition, which began to grow very formidable in the questions which arose about this time between England and Spain. W. was opposed to war; the grand principle of his action being, according to Archdeacon Coxe, 'the love of peace;' according to Macaulay, however, his aim was the peace not of his country, but of his own administration. In 1740 a motion was made in the house to petition the king to remove Sir Robert W. 'from his majesty's presence and counsels forever.' This motion was negatived by a large majority; but the power of the great minister was evidently shaken. He resigned 1742, Feb. 2, and was created Earl of Orford, with a pension of £4,000 a year. Charges of bribery were now brought against him, and a committee of investigation was appointed by the house of commons, comprising 21 members, of whom only two were of his own party. The report was against him, but it was unsupported by evidence, and proceedings were ultimately dropped. The rest of W.'s life was spent in retirement. In private life he was amiable and good-tempered. Love of power appears to have been his ruling motive of action. He had strong common sense, with clearness of political vision, and next to his own interest he had at heart the interest of his country. Doubtless he bribed largely, but, as Macaulay says, 'We might as well accuse the poor Lowland farmers who paid black-mail to Rob Roy of corrupting the virtue of the Highlanders, as accuse Sir Robert Walpole of corrupting the virtue of parliament.'—See Coxe, *Memoir of Sir Robert Walpole* (1798); Macaulay's *Essay on Walpole's Letters*; Ewald, *Sir Robert Walpole* (1877).

WALPURGIS, *vâl-pûr'gîs* (or WALPURGA, *vâl-pûr'gâ*, or WALBURGA, *vâl-bûr'gâ*), Saint: English nun: about the beginning of the 8th c.—779, Feb. 25; b. in Sussex. She, with her brothers St. Wilibald and St. Wunnibald (sons of a king of the W. Saxons), emigrated about the middle of the 8th c. to Germany, to help in extending Christianity. Wilibald established the bishopric of Eichstadt about 741; and Wunnibald the neighboring convent of Heidenheim about 745. On his death (about 763) W. became its first abbess, and continued in that office through life. Her bones, from which, according to the oldest biography (written in the monastery of Hasenried, by a monk named Wolfhart, about the end of the 9th c.), a miraculous healing oil flowed, were transferred to Eichstadt, where a convent was erected in her honor. There is some significance in the fact that W. was not molested by biting dogs, and was in consequence invoked for protection against them and other ferocious animals. The veneration of W. became widespread. Throughout all Germany, and even in France, the Netherlands, and England, churches and

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Chapels were dedicated to her, relics of her were shown, and festivals celebrated in her honor. The feast of W. falls properly on Feb. 25; but as in some German calendars it is assigned to May 1, the name of W. has become associated, with some noted popular pagan superstitions. May-day was the time of a great pagan sacrificial festival and of the old May assembly of the people. For centuries on that day informal courts of justice continued to be held, the joyful May procession took place, and the kindling of the sacred May-fire. See BELTEIN: WALPURGIS-NIGHT.

WALPURGIS-NIGHT: the night preceding St. Walpurgis (q.v.) Day (May 1), on which, according to the old popular superstition among the Germans, witches rode on broomsticks and he-goats to an appointed rendezvous at the old places of pagan sacrifice—notably the Brocken or highest peak of the Harz Mountains—there to enjoy themselves with their master the devil at the great pagan festival of May-day (q.v.). See BELTEIN: also Goethe's *Faust*.

WALRUS, or MORSE, or SEA-HORSE: amphibious mammal of the genus *Trichechus* and family *Phocidae*, agreeing with the rest of that family—the seals—in the general form of the body and limbs, but widely differing from them all in the head, which is remarkable for enormous development of the canine teeth of the upper jaw, and the tumid appearance of the muzzle caused by the magnitude of their sockets and by the thickness of the upper lip. These great canine teeth form two tusks directed downward, and the lower jaw becomes narrow in front, so as to pass between them. There are no canine teeth in the lower jaw. The incisive teeth are small, six in the upper jaw and four in the lower, mostly disappearing from adult animals. The molars—at first five on each side in each jaw, but fewer in the adult—are simple and not large; they have the crowns obliquely worn. The nostrils, as if displaced by the sockets of the tusks, open almost upward, at some distance from the muzzle. The eyes are small; and the ears have no auricle, or, in popular language, there is no ear.—There is (as usually classified) only one known species (*T. rosmarus*), sometimes called the **ARCTIC WALRUS**, inhabitant of Arctic seas and of colder parts of the n. temperate zone. The W. of the n. Pacific is by some writers made a distinct species, *T. obesus*. The W. sometimes attains a size greater than that of the largest ox; and the tusks are sometimes 24 in., or even 30 in. long, but their ordinary length is only about 12 in. The W. is gregarious, and is often seen in great herds, which sometimes leave the water to rest on the ice or on the land, where, however, their movements are very awkward and clumsy, and the hunter assails them with ease; though when hundreds are together the adventure is not without danger, as they must be assailed with spears, their hide being thick enough to resist a rifle-bullet. The W. uses its tusks for protecting itself or young from attack, for combating with its enemy the polar-bear, for aiding it in climbing upon ice; but principally, it is supposed, for

WALSALL—WALSH.

tearing seaweed from submarine rocks, and for digging mollusks, crustaceans, etc., from the sand. The female M. has great affection for her young, and will defend it to the last extremity; the young also remains beside the mother even after she is killed. When one of these animals is attacked, the rest of the herd—at least if in the water—hasten to its assistance. The W. is very capable of being tamed.—It is much sought by the inhabitants of the most northern parts of the world for its skin, thongs of which seem to have been generally used in former times for ropes and cables—esteemed so valuable that the Finlanders paid tribute in this article; while its oil—not very abundant—is employed like seal-oil; and the tusks are valued as ivory, though inferior to those of the elephant. The flesh is coarse, but is an important food of the Esquimaux. The young W. has not large tusks like the adult.

The name Morse is from the Russian *Morss* or Lapp *Morsk*. The name *Walrus* is Norwegian [*Hval-ros*, whale-horse]. Another Norwegian name is *Rosmar*, supposed to be from the Teutonic *ros*, horse, and *mar*, the sea.

WALSALL, *wawl'sawl*: municipal and parliamentary borough, Staffordshire, England; on an affluent of the Tame; 8 m. n.n.w. of Birmingham, 123 m. n.w. of London. Its public buildings are accounted more than usually handsome, and include a number of churches; a free grammar school, founded 1554 for educating the boys of the town in classics; the Blue-Coat School; several board Schools; and a number of charitable institutions. The iron manufacture, for which the situation of the town on the edge of the s. Staffordshire mineral field affords facilities, is the staple industry. Tanning, currying, and manufacture of harness and harness furniture and of all kinds of leather goods, are extensively carried on. Coal and lime works are in operation in the vicinity, and there is extensive trade in malt.—Pop. (1881) 59,402; (1891) 71,791.

WALSH, *wölsh*, ROBERT, LL.D.: author: 1784–1859, Feb. 7; b. Baltimore, Md. He was educated at St. Mary's, Baltimore, and Georgetown Coll., D.C. After a protracted tour in Europe, he began the practice of law in Philadelphia 1810. He founded, 1811, the first Amer. quarterly review—the *Amer. Review of History and Politics*; was editor of the *Amer. Register* 1817–8, and of the *National Gazette* 1819–36. The *Amer. Review* having died at the close of its second year, W. resuscitated it 1827, and conducted it with much ability till 1836. He resided in Paris from 1836 till his death, and was U. S. consul there 1845–51. Besides his editorial labors on the periodicals above named, W. performed a great amount of other editorial work, and was author of numerous books; he was, besides, a frequent correspondent of the *National Intelligencer* and the *Journal of Commerce*. Among his own writings are: *Essay on the Future State of Europe* (1813); *Didactics: Social, Literary, and Political* (2 vols. 1836).

WALSH—WALSINGHAM.

WALSH, WILLIAM, D.D.: archbishop: b. Dublin, Ireland, 1841. He was educated at the Catholic Univ. of Ireland and at Maynooth College, and after graduating at Maynooth spent 3 years on the Dunboyne establishment in post-graduate theol. studies. He became prof. of theol. at Maynooth 1867; vice-pres. 1878; pres. 1880, chosen by unanimous voice of the Irish bps. Before the parliamentary 'Bessborough Commission,' 1869-70, W. as proctor for the bps. and tenants conducted their case against the Duke of Leinster, landlord, with great skill and discretion: his acts in this investigation had much influence in determining the tenor of the Land Act of 1881. At the death of Cardinal McCabe, the clergy chose W. vicar-capitular; they also named him to Rome for abp. of Dublin. The Brit. cabinet had a different sort of candidate for the place, and the pope's choice coincided with that of the cabinet; but the people and clergy of Dublin and Ireland prevailed. W. is considered by the Irish the first abp. of Dublin since the death of St. Lawrence O'Toole who has been free from the taint of 'Castle influence.' He testified before the Parnell Special Parliamentary Commission 1888-9, and did much to discredit Richard Pigott, the perjured witness of the London *Times* and the Brit. govt. 1888-9. He has been active in questions of popular education, trade strikes, and temperance. He has written much for reviews, and has published many books—e.g., *De Actibus Humanis*, a treatise on one branch of moral theology; *Harmony of the Gospel Narrative of the Passion*; *Liturgical Music of the Mass of the Dead*; *Grammar of the Gregorian Music*. On questions of secular concern he has published *A Plain Exposition of the Land Act of 1881*; *Addresses*, on various subjects; *Addresses on the Irish University Question*; *Statement of the Chief Grievances of the Catholics of Ireland in the Matter of Education*, etc.

WALSINGHAM, wŏl'sing-am, Sir FRANCIS: English statesman: about 1536-90, Apr. 6; b. Chiselmurst, Kent; of ancient Kentish family. He studied at King's College, Cambridge, and afterward travelled on the continent, where he remained until the accession of Queen Elizabeth. Burleigh, with his usual discernment in selecting men of talent, discovered his abilities, brought him into office, and sent him on an embassy to France 1570, Aug. He remained in Paris until 1573, Apr.; and discharged diplomatic duties with such consummate skill that he was, on recommendation of his great patron, appointed one of the principal secretaries of state to Elizabeth. He was also sworn of the privy council, and knighted. In 1578 he was sent on an important embassy to the Netherlands; 1581 to France, in connection with negotiations for toleration of the Huguenots; and 1583 to Scotland. He was, with some reason, regarded by the adherents of Mary, Queen of Scots, as the most insidious of her enemies in the English council. He contrived to intercept most of her letters, and after having deciphered them sent them to their destination, in order to obtain fresh intelligence from their answers: some of these deciphered letters are preserved

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in the British Museum. W. soon held Mary secure in the toils. Some time previous to 1583, Sep., he had bribed to his service Cherelles, sec. to the French ambassador Castelnau, in whom Mary placed implicit confidence. W. also won over Gray, envoy of the Duke of Guise, and other friends of Mary, to James VI. (James I. of England), who employed Gray to manage his correspondence with his mother and his friends in France. The most secret letters of Mary and of James thus came into W.'s hands. Until Babington's conspiracy there was no evidence for charging Mary with being accessory to any of the plots formed against the life of Elizabeth. Through spies in the pay of W., all the correspondence of Mary and her friends passed into his hands. After the discovery and execution of Babington, etc., W. went to Fotheringay as one of the commission to try Queen Mary. She charged him with having forged her correspondence with Babington produced against her as proving her complicity in the plot to assassinate Elizabeth; when W. rose in his place and solemnly called God to witness that he 'had done nothing unbecoming an honest man.' Elizabeth signed her death-warrant with a jest on W.'s hatred of the Queen of Scots. The accusation that W. brought Mary to the block by forging her letters can scarcely be maintained on her mere denial of the letters; inasmuch as in that denial she denied also all knowledge of the Babington conspiracy, whereas Mendoza the Spanish ambassador had written to Philip II. that Mary, while the plot was in progress, had informed him that she had full acquaintance with it.—W. was distinguished even among the ministers of Elizabeth for acuteness of penetration, extensive knowledge of public affairs, and profound acquaintance with human nature. His administration of foreign affairs involved extensive use of bribery and espionage: he is said to have had in his pay 53 agents and 18 spies, in various countries; and no minister in Europe was better informed of the many intrigues of foreign courts. Notwithstanding this diplomatic duplicity, which was then universal among public men, W.'s personal integrity and disinterested patriotism are undoubted. He was a patron of learning, was of strict morals, favored the Puritan party, and in his later days was much given to religious meditation. He retired from public affairs some time before his death, and resided at his house in Barn Elms, where he died. Elizabeth, though acknowledging his diligence, genius, and important services, yet kept him poor. His plainness of speech as her adviser, and his Puritan tendency, were not according to her taste. There remain in the British Museum (Harleian MSS.) various letters from W. complaining of his being wholly unable, on his scanty appointments, to support his establishment, though very inadequate to his dignity of ambassador in France. He had become surety for the debts of his son-in-law Sir Philip Sidney; and after Sidney's death a flaw in the legal documents involved W. in financial ruin. Camden says he died so far in debt that he was buried privately by night in St. Paul's Church, without any

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funeral solemnity. The queen was chary even in conferring honors on him, for he received nothing but his knighthood, and held no offices when he resigned the charge of foreign affairs. He was married; and his daughter Frances became successively the wife of Sir Philip Sidney, of the brilliant and unfortunate Earl of Essex, and of the brave soldier Richard de Burgh, 4th Earl of Clanricarde.

WALTER, *waw'l'tér*, JOHN: printer: 1739–1812, Nov. 12; b. England. He was a printer in London, and purchased the patent-rights in an invention designed to simplify the work of type-setting. The system was tried, but not with very favorable results, in the composing-room of a newspaper, the London *Daily Universal Register*. For the use of his patent-rights W. obtained an interest in the *Register*, and thus laid the foundation of a great fortune; for later the *Daily Universal Register* became the London *Times* (q.v.).

WAL'TER, JOHN: publisher: 1784–1847, Nov. 27; son of John W. He became manager of the London *Times* (q.v.) 1803, and by adopting many improved processes in printing-presses was able to meet the rising demand for the *Times*. He introduced into the *Times* office steam-power 1814, Nov. 27—the first employment of steam for practical work in printing. W. accumulated a large fortune, and built and endowed a chh. near his country-seat in Berkshire.

WAL'TER, JOHN: publisher: 1818, Oct. 8–1894, Nov. 3; b. London; grandson of the founder of the *Times*. He was educated at Oxford, and was called to the bar 1847; was in parliament as liberal conservative 1847–65 and 1868–85. His conduct of the *Times*—though successful on the whole—was not in all respects characterized by the wisdom and shrewdness which marked the *régime* of his father and grandfather. The *Times* was mulcted in substantial damages and had to pay enormous law costs for having become the dupe of an Irish perjurer. The third John W. erected a new office for the *Times*, and for himself a magnificent house in the suburbs of London.—See TIMES, THE.

WAL'TER, THOMAS USTICK, D.C.L., LL.D.: architect: 1804, Sep. 4–1887, Oct. 30; b. Philadelphia. He entered the office of William Strickland, architect of the U. S. mint at Philadelphia, 1819, and two years later, having acquired knowledge of linear drawing, and some acquaintance with the practice of architects, devoted himself for seven years to liberal studies; he then returned to the architect's office for two years, after which he began practice as an architect on his own account. Among his works in Philadelphia are the Moyamensing prison and Girard Coll. building. He constructed for the govt. of Venezuela a breakwater at La Guayra. In Washington, D. C., he designed extensions of many public buildings.

WALTHAM.

WALTHAM, *wôl'thăm*: city in Middlesex co., Mass.; on the St. Charles river, and on the Fitchburg and the Boston and Maine railroads; 10 m. w. of Boston. It contains several churches, graded schools, New Church Institute of Education, public library, 1 national bank (cap. \$150,000), 1 savings bank, large park, and 2 daily newspapers. The city has large and thriving business interests, and is growing rapidly; it has gas and electric light plants, water-works, abundant water-power, and a street railroad connecting it with the city of Newton. W. is an attractive place of residence. A notable feature is Prospect Hill, 480 ft. high. W. is celebrated for its two great watch factories, the largest in the world, where watch-making by machinery was first attempted, and has been developed with such success and on a scale so extensive that its products are known and prized all over the civilized world. W. is notable also for its cotton-mills, one of which, erected 1814, was the first large one in America. Pop. (1880) 11,712; (1900) 23,481.

WALTHAM ABBEY—WALTHER.

WALTHAM ABBEY, or WALTHAM HOLY CROSS: market-town, county of Essex, England; on the banks of the Lea; 13 m. n. of the e. part of London; on the Great Eastern railway. It contains a spacious Norman church, originally belonging to an abbey. The river Lea here divides into several branches, which are made to turn gunpowder and flour mills belonging to government. Enfield Lock, at which is situated the celebrated govt. factory for rifles, etc. (see SMALL-ARMS FACTORIES, ROYAL), is about a m. distant; and many of the hands there employed live in and around W. A. A weekly newspaper is published. —Pop. (1881) 5,368; (1891) 6,066.

WALTHER, KARL FERDINAND WILHELM, D.D.: 1811, Oct. 25–1887, May 7; b. Langenchursdorf, Saxony: Lutheran minister and author. He was for a time pastor at Braunsdorf, Saxony. He emigrated to America with a large colony of his countrymen 1839, and settled in Perry co., Mo. He became pastor in St. Louis 1841. He founded and edited *Der Lutheraner* and a German theological journal entitled *Lehre und Wehre*. He was a leader in the extreme Lutheran confessionalism, or strict adherence to the dogmatical standard, and was colloquially termed ‘the Lutheran pope.’ He organized in 1846 the Mo. Synod, which was the germ of the Synodical Conference. He was prof. in the Lutheran Theol. Seminary at St. Louis from 1850 until his death. He was charged with holding Calvinistic principles, which he denied, and with which his doctrine of universal redemption would be quite inconsistent. He published a number of theological works in German; numerous sermons; and *American Lutheran Pastoral Theology* (1872).

WALTHER VON DER VOGELWEIDE, *vâl'tér fôn dër fô'ghêl-vî'déh*: greatest and most famous Minnesinger (q.v.) of the middle ages: b. between 1165 and 70, in Franconia or in Austria; d. about 1230. Although his family was noble, he had no possessions, and became a minstrel as much perhaps from necessity as from impulse. His master and early model was the elder Reinmar. It is thought that his first public performances in ‘singing and saying’ date from about 1187; soon after which he found a warm patron in Friedrich the Catholic, Duke of Austria. But this prince having died 1198, W. began the life of a wandering minstrel, visiting the courts of most of the German sovereigns. A few details of his career are known. He twice (1199 and 1205) spent some time at the court of Emperor Philipp; and then lived six years at Eisenach with a generous patron, Hermann, Landgraf of Thuringia. During 1214–5 he repeatedly visited Emperor Otho, by whom, as well as by Philipp, he seems to have been treated with unkingly parsimony. From 1217 to 19 he lived with Duke Bernhard in Carinthia, then returned to Austria; and 1220 received from Friedrich II. a small estate at Würzburg. His grave has long been pointed out in the Laurence Garden of the cathedral of Würzburg; but a new monument was erected to him 1843. W. far excelled his master Reinmar, whom he survived about 20 years, both

in matter and style; while in richness and versatility of mind all the other Minnesingers are far behind him; for to his wide sympathies and matured art all themes were alike: tenderness and depth no less than cheerfulness and gayety, deep earnestness as well as playful raillery. He did not confine himself, like Reinmar, to minnelays, but wrote also hymns, eulogies of his patrons, and didactic pieces. He sang of the duties and dignities of the emperor; of the obligations of princes and vassals; of the rights and wrongs of the question between the pope and the emperor; of the glory of the true church: and often his song conveyed earnest and cutting censure. But it was only on conviction that he gave praise or blame, never influenced by favor or prejudice; and his censures of the church were those of a candid but pious believer. From a decided patriotic feeling, he stood firmly by the empire and the emperor in opposing the pretensions and usurpations of the pope. His writings on this subject had a widespread and powerful effect; they alienated, according to the testimony of a contemporary, Thomasin, thousands from the pope, and determined the politics, so to speak, of the German poets for the whole century. W. was soon recognized by his contemporaries as the master of lyric poetry; and the traditions of the later Minnesinger schools place him among the 12 who, in Emperor Otho the Great's time, originated and established the art of minstrelsy. Lachmann brought out a masterly critical ed. of W.'s writings (Berl. 1827, 3d ed. 1853), and Simrock an excellent transl. (with explanations by Simrock and Wackernagel, 2 vols. Berl. 1833, 2d ed. Leip. 1853); Uhland wrote a beautiful account of his life and writings (*W. von der Vogelweide, ein altdeutscher Dichter*, Stuttg. and Tüb. 1822), and Hornig a complete *Glossarium* to his poems (Quedlinb. 1844).—See Reuss, *W. von der Vogelweide* (1843); Daffis (1854), Opel (1860), Rieger (1863), Kurz (1863), and Menzel (1865).

WALTON, *waw'l ton*, BRIAN, D.D.: English bishop, and editor of the *London Polyglot* (q.v.): 1600–1661, Nov. 29; b. Cleveland, Yorkshire. He was educated at Cambridge, graduating at Peterhouse 1619. In 1626 he became rector of St. Martin's Orgar, in London, and 10 years later rector of Sandon, in Essex, a prebend of St. Paul's, and chaplain to the king. In 1641 he became involved in the troubles of the time, and articles were brought against him in parliament; he was stripped of his preferments, and ordered into custody as a delinquent. In the retirement which now became necessary, W. planned, and with the help of some of the ablest scholars of the country prepared, the great 'London Polyglot' Bible (1657, 6 vols. folio)—the first book ever published in England by subscription: see POLYGLOT. At the restoration 1660, W. again became chaplain to the king, and was consecrated bp. of Chester. He died in London. W. was also the author of *Introductio ad Lectionem Linguarum Orientalium* (1654); and *The Considerator Considered* (1659), an answer to the *Considerations* of Owen on the *Polyglot*,

WALTON.

WALTON, GEORGE: jurist: 1740–1804, Feb. 2; b. Frederick co., Va. He acquired an education amid great discouragements in early life; and after serving an apprenticeship in carpentry, studied law and began practice in Augusta, Ga., 1774. When the colonies were nearing the point of conflict with England, W. was active in awakening the people to a sense of their rights, and addressed public meetings assembled to consider the state of affairs. He was one of the four signers of a call for such a meeting in Savannah 1774, July. He was delegate to the continental congress 1778, Feb.—1781, Oct., and signed the Declaration of Independence. When Savannah was captured by the British 1778, Dec., W., who as col. commanded a militia battalion, was severely wounded and was held prisoner till 1779, Sep. Then he was elected gov. of Ga.; he was gov. again 1789. He was appointed chief-justice of Ga. 1783; and 1795–6 was U. S. senator. He was repeatedly elected to the state legislature.

WALTON, *waw'ton*, IZAAK: author of *The Compleat Angler*: 1593, Aug. 9—1683, Dec. 15; b. Stafford, Eng.; son of one Jervis W., a yeoman. Of his earlier life little is known. In 1624 we find him settled in Fleet street, London, as a hosier. In the end of 1626 he married Rachel Floud, descendant of Abp. Cranmer. From George Cranmer, her uncle, who had been a pupil and friend of Hooker, it is thought likely that W. derived much of the material for his Life of that eminent man. She died (1640, Aug.) in giving birth to a daughter, having had two sons, neither of whom survived her. In 1643 W. retired from business with such a modest competence as sufficed for his simple way of life; and 1647 he married Anne Ken, half-sister of Bp. Ken. She died 1662, to the great grief of her husband, who survived her many years. He died at the age of 90, in the house of Dr. Hawkins, his son-in-law, prebendary of Winchester Cathedral, and was buried in the vault of that sanctuary.

W.'s first literary work was the 'Life of the Author' prefixed to Donne's *Sermons* (1640). This was followed by Lives of Hooker, Sir Henry Wotton, and George Herbert, in succession; the four being reissued in a collected ed. 1670. In 1678 the Life of his friend Bp. Sanderson was added. *The Compleat Angler, or Contemplative Man's Recreation*, was published 1653. A *fac-simile* of the original ed. was published 1875, and from first to last more than 50 editions have appeared. To the ed of 1676 a little treatise on Fly-fishing was added by W.'s friend Charles Cotton, in whose fishing-house, on the banks of the river Dove, many later years of W.'s happy and blameless life lapsed peacefully in his favorite recreation, and in his loving biographies of his eminent clerical friends. *The Compleat Angler*, as a treatise on the art of angling, is obsolete; but it continues to be read for its charming simplicity of manner, its pastoral freshness and poetry, and the pure, peaceful, and pious spirit breathed from its quaint old pages. The Lives, though somewhat less widely known, are in their kind not less exquisite and

WALTZ—WAMPUM.

unique. Wordsworth has dedicated to them a beautiful sonnet, in which he speaks of the five saintly names of the subjects of them as

Satellites burning in a lucid ring
Around meek Walton's heavenly memory.

WALTZ, n. *wawolts* [Ger. *walzer*, a waltz; *walzen*, to roll]: the name of the national dance of Germany, probably of Bohemian origin, introduced into other countries as a fashionable dance about the end of the 18th c., and now in great vogue everywhere. It is danced by two persons who whirl round on an axis of their own and at the same time move quickly in a circle; the kind of music, usually written in $\frac{3}{4}$ time, which accompanies the dance: V. to dance a waltz. **WALTZ'ING**, imp.: N. the act or practice of dancing a waltz or in the waltz. **WALTZED**, pp. *wawoltst*. **WALTZ'ER**, n. *-ér*, one who waltzes.—The *Trois-temps Waltz* is the regular form, but some time ago the *Valse à Deux Temps*, containing six steps to every two of the trois-temps waltz, was generally adopted. It is not so graceful as the older one, because not so correspondent to the rhythm of the music, and has now given place to the *Valse à Trois Temps*.

WALWORTH, *wōl'wérth*, REUBEN HYDE, LL.D.: jurist; 1788, Oct. 26—1867, Nov. 27; b. Bozrah, Conn.; son of Benjamin W., a revolutionary soldier descended from Wm. Walworth, who settled on Fisher's Island, N. Y., 1671. W. was a school-teacher at the age of 16 years, began to practice law 1809, and settling in Plattsburg, N. Y., quickly attained high rank as a lawyer; was appointed county judge 1811; was representative in congress 1821–23; judge of the 4th N. Y. judicial dist. 1823–28; chancellor of the state 1828–48, when the court of chancery was abolished. He fixed his residence at Saratoga 1833, and there for many years he met in council many of the foremost political men and jurists of his day—De Witt Clinton, Van Buren, Wm. M. Marcy, Wm. H. Seward, Stephen A. Douglas, James Buchanan, Chancellor Kent, Judge Story, Washington Irving, Fenimore Cooper, etc. In the office of chancellor, W. formulated rules of practice and procedure that vastly simplified the work of the court and made riddance of many needless antiquated forms. Judge Story said that W. was the 'greatest equity jurist living' in his day. He pub. *Hyde Genealogy* (2 vols. 1864).

WAMBLE, v. *wōm'bl* [Dan. *wamle*, to be disturbed with nausea]: in *OE.*, to move or stir, as the bowels do with wind; to roll with nausea and sickness: N. in *OE.*, a squeamish feeling; squeamishness. **WAM'BLING**, imp. *-blīng*: ADJ. rolling or rumbling, as with sickness or hunger. **WAM'BLLED**, pp. *-blid*.

WAME, n. *wām* [AS. *wamb*, the belly: Dut. *wam*, the belly of a fish]: in *Scot.*, the belly.

WAMPUM, n. *wōm'pūm* [Indian—from *wompī*, white]: small beads made of shells, used by the North Amer. Indians as money, and also wrought into belts and ornaments.

WAN—WANDEROO.

WAN, a. *wǎn* [AS. *wann*, dark, livid: W. *gwan*, weak, feeble: Gael. *fann*, faint, feeble: L. *vānus*, empty]: pale, as with sickness; pallid; sallow; dark, gloomy, black—applied to water, the weather, etc.: V. in *verse*, to make wan; to become pallid. **WAN'LY**, ad. *-lǐ*. **WAN'NESS**, n. *-nēs*, a sallow pale color. **WAN'NISH**, a. *-nǐsh*, of a pale color.

WANAMAKER, *wān'a-mā-kēr*, **JOHN**: merchant: born 1837, July 11, in Philadelphia co., Penn.; of German and Huguenot ancestry. He settled with his parents in Ind. 1856, but the next year returned to Philadelphia. While learning the business of clothier, he pub. and edited in Philadelphia *Everybody's Journal*; became salaried sec. of the Young Men's Christian Associations of the United States, and executive officer of the local Y. M. C. Assoc. of Philadelphia 1859; afterward was pres. of the Philadelphia assoc. He embarked in commercial business 1861. In 1868 he founded Bethany College, with its preparatory and training schools. The present immense dry-goods, clothing, and miscellaneous business establishment of John Wanamaker & Co., of which he is head, was founded 1876. He became post-master-gen. of the United States in the administration of Pres. Benjamin Harrison 1889, and brought to his duties his great organizing and executive talent—giving great advance in all branches of the service. At the time of his appointment the annual sales of the commercial establishment amounted to \$25,000,000. W. has established the profit-sharing system; the amount distributed to his employés 1888-9 was more than \$100,000. In 1896 he occupied the A. T. Stewart store in New York, between 9th and 10th streets, on Broadway.

WAND, n. *wǒnd* [Dan. *vaand*; Iccl. *vöndr*, a shoot of a tree, a rod]: a long thin stick; a twig; a staff of authority; a rod used by conjurors and diviners.

WANDER, v. *wǎn'dér* [Ger. *wandern*, *wandeln*, to wander, to travel: Dut. *wandelen*, to roam about (see also **WEND**)]: to move about without a settled course; to ramble; to travel here and there; to go astray; to depart from the subject under discussion; to be delirious; to stray morally, as from the path of duty. **WAN'DERING**, imp.: ADJ. moving about without a settled course; rambling; nomadic; roving; unsettled; disordered in mind: N. a travelling without a settled course; a journey hither and thither; a deviation or digression; a straying away from the right course or from one's home, etc.; the roving of the mind or thoughts; mental disorder; uncertainty. **WAN'DERED**, pp. *-dérd*. **WAN'DERER**, n. *-dér ér*, one who wanders. **WAN'DERING-LY**, ad. *-lǐ*.—**SYN.** of 'wander': to roam; range; rove; stroll; gad; straggle; stray; err; swerve; depart; deviate.

WAN'DERING JEW: see **JEW**, **THE WANDERING**.

WANDEROO, *wān-dér-ō'*: a large monkey, the *Macacus silenus* or *Silenus veter*, native of the coast of Malabar; of deep black throughout, except a ruff of long gray or white hair, from the midst of which the face looks forth, and which descends over the chest, giving the animal a

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very peculiar aspect. This monkey exhibits considerable intelligence and docility, and performs its tricks with an absurd air of gravity.—The name *W.*, however, belongs more properly to monkeys of the genus *Presbytes*, natives of Ceylon, to which the name is given by the Singhalese, and appears to have been transferred by mistake to the species above described, which is not found in Ceylon. The wanderoos of Ceylon are small monkeys. The best-known species is *Presbytes cephalopterus*, found in the low parts of the island. It feeds chiefly on the berries and buds of trees, and is seldom seen on the ground: 20 or 30 are generally found together in a troop. When alarmed, they show marvellous agility in leaping, or rather swinging from branch to branch, using their powerful arms alternately, often flinging themselves obliquely so as to catch the lower bough of an opposite tree, and taking advantage of its rebound to carry them up again till they can reach a higher branch; the females, all the while, being often encumbered by their young, which cling to them. This monkey is far from being so mischievous as monkeys in general. In captivity it is remarkable for the gravity of its demeanor and for an air of melancholy in its expression and movements which is completely in keeping with its snowy beard and venerable aspect. Its disposition is extremely gentle and affectionate; it is intelligent and docile, and very cleanly in its habits.—Several other species of *W.* or *Presbytes* are found in Ceylon, some in the more elevated parts of the island.

WANE, *v.* *wān* [Goth. *vans*, wanting: AS. *wan*, deficient, wanting: Icel. *vanr*, wanting: perhaps connected with **WAN**, which see]: to decrease; to be diminished; to fail; to sink; opposed to *wax*: N. diminution; decrease; decline. **WANING**, *imp.*: ADJ. decreasing, as the moon; declining. **WANED**, *pp.* *wānd*.

WANGAN, *n.* *wǎng'an* [Amcr. Indian]: a name applied in Maine to a lumberer's boat for carrying provisions, tools, etc.

WANGHEE, *n.* *wǎng'hē*: an eastern cane, the *Phyllostachys nigra*, ord. *Graminacæ*, used in making walking-sticks, chairs, etc.; also spelled **WHANGEE**, *whǎng'ê*.

WANION, or **WANNION**, *n.* *wǎn'yǐn* [probably from *wane*, implying ill luck: OE. *in the waniand*, at the waning of the moon]: in OE., a hard blow; detriment. **WITH A WANION**, with a vengeance; implying a curse.

WANNES, **WANNISH**: see under **WAN**.

WANT, *n.* *wǒnt* [AS. *wan*, deficient: Icel. *vanta*, to be wanting or deficient in (see also **WANE**)]: the lack or absence of that which is necessary or useful; state of not having; deficiency; necessity; poverty: V. to be without; to be destitute of; to be deficient; to fall short of; to need; to fail; to desire; to wish for; to long for. **WANTING**, *imp.*: ADJ. absent; deficient. **WANTED**, *pp.*—**SYN.** of 'want, *n.*': need; lack; penury; indigence; deficiency; defect; failure; destitution; scarceness; scarcity; dearth.

WANTAGE—WAPACUT.

WANTAGE, *wán'tāj*: market-town in Berkshire, England; in the vale of the White Horse; 26 m. w. of Reading, 60 m. w. of London. It manufactures agricultural implements, and has extensive trade in grain.—Pop. (1871) 3,295; (1881) 3,488; (1891) 3,669.

WANTON, a. *wǎn'tǒn* [AS. *wan*, deficient (see WAN), and *togen*, drawn or led, educated, pp. of *teón*, to draw, to educate: OE. *towen*, bred—properly signifying uneducated, ill brought up]: ill brought up; undisciplined; unrestrained; loose; indulging the natural appetites; disposed to lewdness; running to excess; reckless; lively or sportive, as 'the *wanton* wind;' quick and irregular motion; in OE., luxurious; superfluous; not regular: N. a lascivious man or woman; a woman inclined to lewdness; a strumpet; in OE., a spoiled child; a trifler: V. to play or revel without restraint; to behave with lewdness; to revel; to move nimbly and irregularly. **WAN'TONING**, imp. **WAN'TONED**, pp. *-tǒnd*. **WAN'TONLY**, ad. *-lǐ*, lewdly; without restraint; loosely; sportively; playfully. **WAN'TONNESS**, n. *-nēs*, lewdness; lasciviousness; licentiousness; sportiveness; frolic.—SYN. of 'wanton, a.': skittish; frisky; lecherous; lascivious; libidinous; sportive; frolicsome; airy; coltish; lustful; licentious; dissolute.

WANT-WIT, n. *wǎnt'wīt* [*want*, and *wīt*]: in OE., a fool; an idiot.

WAPACUT, n. *wǎp'a-kūt* [N. Amer. Indian name]: the snowy owl.

WAPATOO—WAPPENED.

WAPATOO, or WAPPATOO, n. *wǎp'a-tó*, or WAPPATO, n. *wǎp'a-tō*: name given by the Indians of Oregon to *Sagittaria littoralis*, a species of arrowhead, the tuber of which they eat.

WAPENSHAW: see WAPINSCHAW.

WAPENTAKE, n. *wǎpn-tāk*, or WA'PENTAC, n. *-tāk* [AS. *wǣpentac*—from *wǣpen*, a weapon; Eng. *take*]: a division of certain English counties, nearly coinciding with *hundred*—so called because the inhabitants within such divisions, assembled for public purposes, *touched the weapon* of a new chief in sign of continued loyalty. *Wapentake* is obsolete except in Yorkshire.

WAPINSCHAW, or WAPENSHAW, n. *wǎp'ín-shaw* [AS. *wǣpen*, a weapon; *sceawian*, to view, to look at—*lit.*, a *weapon-show*]: a review of persons under arms, formerly made at certain times in every district of Scotland. The name is now familiarly applied to a gathering of the volunteer corps of a district for purposes of inspection, for shooting, etc.—The *Wapinschaw*, or periodical gathering of the people for the purpose of exhibiting their arms, was ordained by various Scots statutes of the 15th and 16th c., which directed each individual to be armed on a scale proportioned to his property. In the time of war or rebellion, proclamations were issued charging all sheriffs and magistrates of burghs to direct the attendants of the respective wapinschawings to join the king's host. During the reign of the later Stuarts, attendance on the wapinschaws was enforced with considerable strictness; and in addition to military exercises, sports and pastimes were carried on by authority at these gatherings. The Covenanters, disapproving of the sports at these gatherings, did what they could to discourage attendance.

WAPITI, n. *wǎp'ĩ-tĩ* [Indian name]: the North Amer. elk, *Cervus Canadensis*, nearly allied to the stag, but considerably exceeding it in size, being 4½ ft. in height at the shoulder. It is a native of N. America, found as far s. as N. C., and as far n. as 56° or 57° n. lat., but is now becoming rare. It is chestnut-red on the upper parts, grayish in winter; the sides gray; a pale yellowish patch on each buttock, bounded by a black line on the thigh; the neck, a mixture of red and black, with long, coarse, black hair falling down from it in front like a dewlap; a black mark at each angle of the mouth. The hair is crisp and hard, but there is a soft down beneath it. The antlers are large, much like those of the stag, but the first branch bends down almost over the face. The W. is called *Elk* and *Gray Moose* in some places, though very different from the true elk or moose-deer. Its haunts are chiefly in low grounds, or in parts of the forest adjacent to savannas and marshes. Its flesh is coarse and dry. The hide makes excellent leather.

WAPPENED, a. *wǎp'pnd* [origin and meaning uncertain]: in *OE.*, perhaps wavering; hesitating. WAPPERED, a. *wǎp'pèrd*, restless; fatigued.

WAR.

WAR, n. *wawr* [OF. *werre*; F. *guerre*; It. *guerra*, war—from OHG. *werra*, vexation, strife: O. Dut. *werre*, strife, war: Ger. *wirren*, to entangle, to embroil]: an armed contest between nations or states (*international war*), or between different factions or parties in the same state or nation (*civil war*); a contest carried on by force of arms; open hostility; the profession of arms; opposition or contest of any kind carried on between two parties; in *OE.*, forces; army: V. to attack a state with force of arms; to carry on hostilities; to contend; to strive with violence; in *OE.*, to make war upon. WAR'RING, imp. WARRED, pp. *wawrd*. WAR'FARE, n. -*fär* [*war*, and *fare*]: the carrying on of war; contest or struggle. WAR'LIKE, a. -*lik* [*war*, and *like*]: fit or disposed for war; soldierly; belonging to war. WARRIOR, n. *wawr'yér*, one engaged in war; a soldier. WAR'RIORESS, n. -*ès*, in *OE.*, a woman soldier. CIVIL or INTESTINE WAR, a war carried on between parties belonging to the same state. WAR-CRY, a national or party cry or shout made in charging the enemy in battle; a party watchword or principle of action. *War-cries* for mutual recognition and encouragement in battle have always been common, each rude nation or tribe having its own. The ancient war-cry of the English was *Saint George!*—of the Spaniards, *San Jago!*—that of the French, *Mountjoie Saint Denis!* In the feuds of the middle ages, each party, or the retainers of each noble family, had a distinctive war-cry. Sometimes the war-cry was the name of the family. Thus, in Scotland, the retainers of the noble houses of Douglas and of Home rushed into battle with the cry of *A Douglas! a Douglas!* or *A Home! a Home!* The French armies under Napoleon were accustomed to charge with shouts of *Vive l'Empereur!* WAR DEPARTMENT, that division of the executive government of a country which controls all matters connected with the army. In the United States this department is in charge of the *secretary of war* (see SECRETARIES OF EXECUTIVE DEPARTMENTS, in the United States Government: MINISTRY, in Executive Government). WAR-OFFICE, the department of a state in which its military affairs are managed. WAR-WHOOP, n. -*hwóp*, the yell uttered by savages in advancing to battle. WAR'-WORN, a. -*wörn*, impaired or enfeebled by war. MAN-OF-WAR, a ship armed and equipped for attack or defense. ON THE WAR-PATH, said of Amer. Indians when engaged in a hostile foray.—*War* between states or nations, or between parties in the same state, is analogous to club-law, or the law of the strongest, among the individuals of a community, which is the normal state of things where no legal or fixed rights are established, or where there is no authority to enforce them.

Wars are various in their occasions and objects, breaking out sometimes in consequence of disputes about territorial possessions or material interests, at other times having reference to the establishment of some important point of civil or religious liberty. At one time the art of war was supposed to consist very much in wearing out the

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enemy by a slow process of exhaustion, and thus wars were much protracted; but more recently the greatest generals have rather endeavored to strike sudden and terrible blows, by which the war is sooner ended; and this method, though often adopted with no considerations of humanity, is probably less productive of suffering to mankind than the other.

Among rude nations wars are conducted by tumultuary hosts, suddenly congregated, and in general, after either defeat or victory, soon dispersed. But the wars of the more civilized and powerful nations have long been conducted by armies carefully trained and disciplined; and in the case of maritime powers, by fleets at sea as well as armies on land. Preparation for war among such nations requires not only the forming and training of the army, but vast provision in many various ways of the means and *matériel* of war. Great science and skill are applied to the conduct of military operations, and the principles on which they ought to be conducted have been carefully investigated, and theories tested by an examination of the history of the most important campaigns. See STRATEGY. TACTICS.

The invention of gunpowder has effected great changes in the whole art of war; but the introduction of firearms has rendered battles less sanguinary and ferocious than they previously were. While firearms were yet unknown, warlike engines of various kinds were employed; but close combat was more general, and often more protracted, and the passions of the combatants had thus in ordinary battle more of that exasperation which fearfully characterizes the storming of a town.

In the progress of society, certain *usages of war* have come to be generally recognized. These have greatly varied at different times and in different countries; but the changes in them have been in general favorable to the interests of humanity. Prisoners of war are no longer put to death, nor are they reduced to slavery, as was frequent in ancient times; and their treatment has become increasingly mild and kind. It is a well-understood rule, however, that a prisoner of war obtaining his liberty by exchange or otherwise, with the condition of not serving again during a fixed period against the same power, forfeits his life if he is found so serving and is again taken prisoner. Among all civilized nations, quarter is granted in battle whenever it is sought; and there are certain usages universally prevalent with regard to the capitulation of fortified places, and of bodies of troops hopelessly hemmed in by superior forces, etc.—See GENEVA CONVENTION: RED CROSS ASSOCIATION.

LIST OF NOTABLE WARS.

AFGHAN WARS: (1) War waged in Afghanistan by Great Britain in support of the claims of Shûja Khan to the throne, 1838, Oct. 1—1840, Nov. 4: see AFGHANISTAN. (2) War which ensued on the refusal of Shere Ali to receive a Brit. mission, 1878–9. (3) Military operations in which Great Britain punished the massacre of the Brit. res-

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ident at Cabul, Sir Louis Cavaguari and his staff, 1879-80: see AFGHANISTAN.

AUSTRO-PRUSSIAN WAR: war waged by Prussia and some of the smaller states against Austria, Saxony, Hanover, etc., 1866, June—Aug. 12; sometimes called the *Seven Days' War* and the *Seven Weeks' War*, because of its short duration: see GERMANY.

BROAD-SEAL WAR: contest which arose in the U. S. house of representatives, 1839, Dec., over the admission or exclusion of five whigs from N. J., whose right to seats, though certified by the broad-seal of N. J., was denied by the democrats.

BUCKSHOT WAR: contest, 1838, Dec., in the Penn. house of representatives, between rival whig and democratic organizations, each of which claimed to be *the* house; so called from a whig threat that 'buckshot' would be used.

CIVIL WAR: any armed contest between parties in the same state or country. Specifically, (1) in Eng. history, the war waged by the parliamentary army against Charles I., and the subsequent struggles till the Restoration 1660: see ENGLAND—*History*: REBEL—REBELLION. (2) In U. S. history, the war of secession, 1861-65: see UNITED STATES OF AMERICA.

CORINTHIAN WAR: war waged against the Spartans B.C. 395-387, by Corinth, Argos, Thessaly, and Thebes, and ended by the peace of Antalcidas; so called because hostilities were carried on for the most part near Corinth (q.v.), or in Corinthian territory.

CRIMEAN WAR (q.v.), 1853-56.

FRANCO-GERMAN WAR (q.v.), 1870-1.

FRENCH AND INDIAN WAR, 1754-63: see FRENCH WAR (or OLD FRENCH WAR).

HUNDRED YEARS' WAR: series of wars between England and France, 1338-1453, which ended in the expulsion of the English from France, except from Calais (q.v.), which they retained for a century more.

INEXPIABLE WAR: rebellion of the mercenaries at Carthage (q.v.) at the end of the first Punic war, B.C. 241, and the military operations by which it was suppressed under Hamilcar B.C. 238.

ITALIAN WAR: war waged by Sardinia and France against Austria 1859, Apr.—July 11, resulting in the cession of Lombardy to Sardinia, and the formation of the kingdom of Italy, 1860, Mar. 18: see ITALY.

JUGURTHINE WAR: war waged by the Roman republic against Jugurtha, King of Numidia, B.C. 111: see JUGURTHA.

KING GEORGE'S WAR: American phase of the war of the Austrian succession, 1741-48, in which Great Britain and her colonies in America waged war against France and her Indian allies: see SUCCESSION WARS.

KING PHILIP'S WAR: war between the colonists of New England and the confederated Indians under King Philip, sachem of Pokanoket, 1675-6: see PHILIP, KING.

KING WILLIAM'S WAR: war waged by Great Britain

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and her colonies in America against France and her Indian allies 1689-97.

LATIN WAR: war between Rome and the Latin League, B.C. 340-338, ending in the defeat of the latter: see **LATIUM**.

MARSIC or MARSIAN WAR: see **SOCIAL WAR**.

MEXICAN WAR, 1846-48: see **MEXICO: UNITED STATES OF AMERICA**.

MITHRIDATIC WARS: see **MITHRADATES**.

NAPOLEONIC WARS: wars waged by Napoleon (q.v.) 1796-1815.

OPIUM WAR: war waged by Great Britain against China 1840-42, in consequence of Commissioner Lin's demand that all the opium in the hands of Brit. subjects at Canton should be given up without compensation to the native authorities. The war resulted in the cession of Hong-Kong to the British, the payment of an indemnity of \$21,000,000, and the opening of four new ports to foreign trade—viz., Amoy, Foochow, Ningpo, and Shanghai: see **CHINESE EMPIRE**.

PEASANTS' WAR: see **PEASANT WAR**.

PELOPONNESIAN WAR: see **PELOPONNESUS: GREECE**.

PENINSULAR WAR: war, 1808-14, in Spain and Portugal against the French; chiefly under Sir Arthur Wellesley (afterward Duke of Wellington). The French were driven out of the Peninsula 1814, Apr. 5.

PEQUOT WAR, about 1637: see **PEQUOTS**.

PERSIAN WARS: wars between Persia and Greece B.C. 5th c.: see **MARATHON: THERMOPYLÆ: SALAMIS: GREECE**.

POTATO WAR, 1777-79: see **SUCCESSION WARS**.

PUNIC WARS: three great wars between Rome and Carthage (q.v.) B.C. 264-146.

QUEEN ANNE'S WAR: war waged by Great Britain and her colonies in America against France and her Indian allies 1701-13.

REVOLUTIONARY WAR: see **UNITED STATES OF AMERICA**.

RUSSO TURKISH WARS: see **RUSSIA**.

SALTPETRE WAR: war between Chili and Peru (aided by Bolivia) 1879-83, for possession of certain guano and nitre beds: see **BOLIVIA: CHILI: PERU**.

SAMIAN WAR: war between the Samians and Athenians under Pericles (q.v.) about B.C. 440.

SAMNITE WARS: three wars waged by the Romans against the Samnites (q.v.) and other Italian peoples: (1) B.C. 343-341; (2) B.C. 326-304; (3) B.C. 298-290: see **CAUDINE FORKS: ROME**.

SEMINOLE WARS, in 1817, and again from 1832: see **SEMINOLES: OSCEOLA**.

SERVILE WARS: several wars carried on by the Romans against slaves who had risen in force against their masters. *First*, B.C. 134, when Enoüs, a Greek of Syria, was proclaimed king. After various successes he was captured and cast into prison, where he died. His successor, Cleon, fell in battle, and the war ended B.C. 132. *Second*, B.C. 104, when one Salvius, who took the name Tryphon, was elected

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king; the war came to an end B.C. 99. *Third*, war carried on by the Romans against Spartacus (q.v.) B.C. 73-71; called also the *War of the Gladiators* (q.v.).

SEVEN DAYS' WAR: see AUSTRO-PRUSSIAN WAR, above.

SEVEN WEEKS' WAR: see AUSTRO-PRUSSIAN WAR, above.

SEVEN YEARS' WAR (q.v.): the third Silesian war, 1756-63.

SILESIA WARS: see SILESIA: SEVEN YEARS' WAR.

SOCIAL WAR: war, B.C. 91-88, in which the Italian allies (*socii*) of Rome fought for the privilege of Roman citizenship, with which it had been proposed by M. Livius Drusus to invest them, but which was strongly opposed by the senators, knights, and people. The Marsi took the lead in the movement (hence sometimes called the *Marsic* or *Marsian War*), and almost every nation in Italy, except the Latins, Tuscans, and Umbrians, took part in the contest. Though frequently defeated in battle, they triumphed in the end and obtained the desired franchise: see ROME.

SUCCESSION WARS (q.v.).

THIRTY YEARS' WAR (q.v.).

TROJAN WAR: see TROY.

WAR OF 1812: see UNITED STATES OF AMERICA.

WAR OF SECESSION: see UNITED STATES OF AMERICA.

WAR OF THE FRONDE: see FRONDE.

WAR OF THE GLADIATORS: contest between the Roman power and Spartacus (q.v.) B.C. 73-71; so called because Spartacus, in retaliation for the cruelties of the Romans to the Gladiators (q.v.), made a number of his Roman captives fight as gladiators around the funeral-pile of one of his commanders: see SERVILE WARS, above.

WAR OF THE LOVERS: war waged against Henry III. of France at the instance of the ladies of the Navarrese court, who incited their lovers to take up arms against 'the discourteous sovereign, as the enemy of womankind,' because for politic reasons he had disclosed to Henry of Navarre the amour of his wife with the Viscount of Turenne: 1580, Apr. 15—Nov. 26.

WAR OF THE REBELLION: the war of secession: see UNITED STATES OF AMERICA.

WARS OF THE ROSES: see ROSES, WARS OF THE.

WAR OF WARTBURG: see WARTBURG, WAR OF THE.

WARASDIN, *vá'rás-dín* (Hungarian VARASD, *võh-rõshd'*): city of Hungary, cap. of the county of W.; on the right bank of the Drave; 28 m. n.n.e. of Agram (Zágráb). W. is a royal free city, is to some extent fortified, is surrounded by straggling suburbs; and contains nine churches, a few convents, two gymnasia, and a Real or technical school. Tobacco, liqueurs, and vinegar are manufactured.—Pop. (1880) 10,371.

WARBECK, *wawr'bëk*, PERKIN: pretender to the crown of England: b. London, though said to have been son of a Jew of Tournay, where he spent his boyhood; d. 1499, Nov. 23. In 1490 he appeared at the court of the Duchess of Burgundy, sister of Edward IV. of England; and professed to be the Duke of York, younger of the two

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sons of Edward IV. murdered in the Tower. In 1492 he landed at Cork, where he was welcomed. Subsequently he was received as Duke of York at the court of Charles VIII. of France; and from the court of Burgundy, where he was treated as nephew of the duchess, he went to Kent and attempted a rising against Henry VII. He next went to Scotland, where James IV. gave him the daughter of the Earl of Huntly in marriage. In 1498 he came to Cornwall, took the title of Richard IV. of England, was taken prisoner, escaped from prison, was retaken, was detected in a plot, and put to death at Tyburn.

WARBLE, v. *wawr'bl* [OF. *werbler*, to speak quickly and indistinctly—from OHG. *hwerban*, to set in movement: Ger. *wirbeln*, to whirl, to warble]: to purl or gurgle, as a brook; to chirp or sing, as birds; to quaver any sound; to sing in a quavering or trilling way; to utter musically; in *OE.*, to cause to quaver: N. a quavering modulation of the voice; a song, as of a bird. **WAR'BLING**, imp. *-bling*: N. the act of shaking or modulating notes; singing. **WAR'BLINGLY**, ad. in a quavering or trilling way. **WAR'bled**, pp. *-bld*. **WAR'BLER**, n. *-bler*, one who sings; a songster.

WARBLE, n. *wawr'bl* [etym. doubt.]: in *farriery*, one of those small, hard tumors on the backs of horses occasioned by the heat of the saddle in travelling, or by the uneasiness of its situation; also a small tumor produced by the larvæ of the gad-fly on the backs of horses, cattle, etc.

WAR'BLER: popular name often applied to all the birds of the family *Sylviadæ* (q.v.), many of which, however, commonly receive other popular names, as the Blackcap, Nightingale, Hedge-sparrow, Redbreast, Redstart, Stonechat, Wheat-ear, Whitethroat, etc. (q.v.), while many receive the name Warbler with some adjunct. Several species thus designated belong to the genus *Salicaria*, others to the genus *Sylvia*. The species of the former genus have the tail rounded; in the latter, it is almost square or a little forked. The *Salicariæ* are inhabitants of moist situations, whence they are known as *Sedge Warblers* and *Reed Warblers*; the *Sylviæ* are inhabitants of woods. Of the former genus is the Grasshopper W. (*Salicaria locustella*), frequent in Great Britain. It is found in most parts of Europe, at least during summer, being partially a bird of passage. It is of greenish-brown color, the centres of the feathers dark brown, producing a spotted appearance; the lower parts pale brown. It receives its name from its chirping, grasshopper-like note.—The Sedge W. (*Salicaria phragmitis*) is found usually in thick patches of reeds or willows in marshes. It is of brown color, with various shades finely intermixed; chin and throat white; underparts buff color.—The Reed W. (*Salicaria arundinacea*) is found in many parts of Europe, and its range extends to n. India. It is of uniform pale brown, with tinge of chestnut; chin and throat white; underparts pale buff color. Its nest is attached to the stems of three or four reeds, and formed by winding the branches of their panicles together with a little wool; and is conical and deep, so that the

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eggs or young may not be shaken out when the reeds are shaken by the wind.—The Wood W., known also as Wood Wren (*Sylvia sylvicola*), is common in wooded districts of England; it is olive green, tinged with yellow; wings brown; feathers edged with bright yellow; lower parts yellow and white.—The Willow W. (*Sylvia trochilus*) frequents woods, but builds its nest on the ground. It is of dull olive-green color; wing and tail feathers dark brown, wing-feathers edged with green; underparts whitish, tinged with yellow. There are other British species more rare.—Of this family, Old World Warblers, which are like diminutive thrushes, are the Golden-crowned and Ruby-crowned Kinglets (*Regulus*) of N. America, not uncommon; and the Blue-gray Gnat-catcher (*Polioptila*), pure ashy blue, whitish below, the male with forehead and sides of crown black; it is chiefly southern, but ranges to Mass. and Mich.

The New World Warblers, *Mniotiltidæ*, have very numerous and beautiful species, seen in the n. states mostly in secluded woods, and many of them for only a short time while in transit, spring and autumn. Those most often seen are the Tennessee W. (common west), olive green, head ashy; the Nashville W., similar, but bright yellow below, the male with partly concealed crown-patch of bright chestnut; the Summer W., golden yellow, the breast and sides with brown streaks (very common); the Yellow-rumped W., bluish ash, with black and yellow—also abundant; the common Chestnut-sided W.; and the Maryland Yellow-throat, olive-green, the male with a mask of jet black. The Black-and-white Creeper, the Oven-bird, the Water-wagtail, Yellow-breasted Chat, and American Redstart also belong here. The great variety of less often observed New World Warblers is indicated by their names: the Cape May, the Black-throated Blue, the Black and Yellow, the Cerulean, the Bay-breasted, the Blackpoll, the Yellow-throated, the Orange-throated, the Black-throated Green, the Pine-creeping, Kirtland's, Prairie, Redpoll, Kentucky, Connecticut, Mourning, Hooded, Green Black-capped, Canada, etc.—all occurring e. of the Missouri river, and some further west.—Not a few of the species are reckoned among the birds of the West Indies, because wintering there. Some European species are in like manner found in Africa; and Asia has many species of W., including some European. Australia has many species, some of very beautiful plumage.

WARBURTON, *waw'r-bér-ton*, WILLIAM, D.D.: Bishop of the Church of England: 1698, Dec. 24—1779, June 7; b. Newark, in the county of Nottingham. Young W. received his education at the school of his native town, and at Oakham, in Rutlandshire, returning home 1714 to pursue the profession of his father, an attorney. Having served the necessary apprenticeship, he practiced (it is said) as attorney at Newark; but his natural bent was toward literature, and he had always had a desire to take orders in the church. Quitting the legal profession with this view, he was, after due study, ordained priest 1727. In

1728 he was presented to the rectory of Brand-Broughton, in the diocese of Lincoln, where he remained 18 years, giving his time to intense study. After publishing some unimportant pieces, he issued, 1736, a treatise, *The Alliance between Church and State, or the Necessity and Equity of an Established Religion and a Test Law*. This work drew great and immediate attention; and 1737-8 it was followed by vol. I. of his *opus magnum*, by which chiefly he is remembered—*The Divine Legation of Moses, demonstrated on the Principles of a Religious Deist, from the Omission of the Doctrine of a Future State of Rewards and Punishments in the Jewish Dispensation*. It was an answer to the objection to the divine authority of the Mosaic writings, based by the deists on the ground that Moses gave no revelation of a future life, as a divine revealer certainly would have done. W., instead of pointing out the intimations of a future life which appear in those writings, and showing the perfect fitness of such shadowed revelation to those times, accepted the deistic allegation as fact; and with his perverse liking for paradox asserted that it proved the divine authority of Moses, inasmuch as no human legislator would have omitted such a seemingly important sanction of morality. The work encountered a storm of adverse criticism; but it at once established the position of W. as one of the most potent intellects of the period. Its main argument has long been discredited as more or less 'precarious;' yet the book, in virtue of its vast learning, its vigor, ingenuity, and originality, keeps a place among notable English writings.

Becoming involved in the controversy which followed the appearance of Pope's *Essay on Man*, W. undertook the defense of the poet, and issued, 1739-40, *A Vindication of Mr. Pope's Essay on Man, by the Author of the Divine Legation*. The poet was much gratified; and between him and his vindicator a warm friendship was the result. The poet at his death (1744) bequeathed to W. one-half of his library, and such profit as might accrue from any edition of his works published after his death. In 1757 W. was promoted to the deanery of Bristol; and 1760 Pitt (afterward Earl of Chatham) bestowed on him the bishopric of Gloucester. In his later years his mind became impaired; and he was utterly prostrated by the death of his only son, whom he did not long survive.

W. was a keen polemic—daring, urgent, ingenious, fertile, with great resources of learning; but frequently arrogant in tone, and tending toward rancor and insolence. However, he was devoid of the vices of malice and meanness. He was earnest and constant in his friendships. His argument is often brilliant and powerful; and the positions which he assumes are of a kind to be astounding to both sides in the debate. Among his many controversial works were an attack on the Methodists, a reply to Lord Bolingbroke, a reply to David Hume, and a keen argument with Bp. Lowth on Prophecy. A complete and splendid ed. of his works was pub. 1788, at the expense of his widow, by his friend, Bp. Hurd.

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WARD, *v. waward* [Ger. *wart*; Goth. *vards*, a keeper: It. *guardare*; F. *garder*, to keep (see also **GUARD**)]: to repel; to turn aside anything mischievous, generally with *off*; in *OE.*, to keep in safety; to watch; to defend; to be vigilant: N. watch; guard made by a weapon in fencing; a stronghold; a subdivision of a county in Great Britain, as in Cumberland, Westmoreland, and Durham in the n. of England, and Lanarkshire and Renfrewshire in Scotland, representing a district formerly in charge of a *warden*; in the United States, one of the districts into which a city or town is usually divided for municipal purposes; confinement under guard; custody: person under age committed by lawful authority to the *ward* or care of a guardian; a ward can make no binding contract except for necessities; when a person ceases to be a ward, he has legal right to an accounting from the guardian (see **GUARDIAN: INFANT**): large room in a hospital, devoted to a particular disease or to a class of patients. **WARD'ING**, imp. **WARDED**, pp. **WARD'ER**, n. *-ér*, a keeper; a guardian; a turnkey of a prison; in *OE.*, a truncheon by which an officer of arms forbade fight. **THE WARD OF A LOCK**, a curved ridge of metal in a lock which corresponds to a notch (also called a *ward*) in the proper key and acts as an obstacle to all other keys. **THE WARD OF A TOWN, CITY, PRISON**, etc., so much as is committed to the care of one alderman, councilor, or keeper. **WARD-MOTE**, n. *-môt* (see under **MOTE 2**). **WARD'-ROBE**, n. *-rôb* [F. *garde-robe*]: a room, a portable closet, or a piece of furniture for hanging up wearing apparel in; wearing apparel belonging to any one person at one time. **WARDROOM**, room over the gun-room of a ship where the chief officers other than the commanding officer mess. **WARD'SHIP**, n. care and protection of a ward; state of being under a guardian (also see below). **WARD'EN**, n. *-ên* [F. *gardien*]: one who has ward or guard of a thing; a chief or principal keeper, as in a prison; a name applied to the principal of some colleges; a warden-pear. **WARDEN OF THE CINQUE PORTS** (see **CINQUE PORTS**). **WARDEN-PEAR**, a pear that keeps well and is used chiefly for roasting or baking. **WARD IN CHANCERY**, a minor under the guardianship of the court of chancery. **TAXED WARD** (see **WARD'HOLDING**).

WARD, ARTEMAS: soldier: 1727-1800, Oct. 28; b. Shrewsbury, Mass. He graduated at Harvard 1748, and soon became a member of the Mass. gen. assembly and of the executive council. He was maj. in a militia regt. 1755, and was with Gen. James Abercrombie in an expedition against the French and Indians 1758. The provincial congress of Mass. appointed him brig.gen. 1774, Oct. 27, and commander-in-chief of the Mass. forces 1775. The continental congress made him maj.gen., and he commanded in the siege of Boston till the arrival of Washington; then W. was second in command. He resigned his commission 1776, Apr. W. became chief-justice of the Worcester co. common pleas court 1776; was pres. of the Mass. executive council 1777; then for 16 years member of the legislature. He was representative in congress 1791-95.

WARD, ARTEMUS: see BROWNE, CHARLES FARRAR.

WARD, EDWARD MATTHEW, R.A.: English painter: 1816-1879, Jan. 15; b. Pimlico, London. He early showed a taste for art, and was educated in a way to develop it. In 1835 he was sent to study at the Royal Acad.; and 1836 he went to Rome, where he gained, 1838, a silver medal, given by the Acad. of St. Luke. He returned to England 1839, stopping on the way at Munich, where he had lessons in fresco-painting from Cornelius. Thereafter he annually exhibited pictures at the Royal Acad., though for some years without decisive recognition. In 1843 his picture, familiar as engraved, *Dr. Johnson perusing the Manuscript of the 'Vicar of Wakefield,'* drew great admiration. Of the eight pictures which he was commissioned to furnish for the corridor of the house of commons, two were done in oils and two in water-glass: the merit of all eight is unquestioned; one, *The Last Sleep of Argyll*, is ranked by competent judges among the most masterly British works in this kind. W. was elected an associate of the Royal Acad. 1847, and academician 1855. Among his more notable pictures are: *The Fall of Clarendon*, *The Last Sleep of Argyll*, *The Royal Family of France in the Prison of the Temple*, *Charlotte Corday led to Execution*. W.'s pictures, though sometimes open to criticism in a purely technical view, have had wide popularity in reproduction as engravings.—He died from a wound inflicted by his own hand during mental aberration.—His wife, HENRIETTA W., granddaughter of James Ward, R.A., is favorably known as a painter.

WARD, ELIZABETH STUART (PHELPS): author: b. Andover, Mass., 1844, Aug. 13; dau. of Austin Phelps, D.D. (q.v.); wife of Herbert D. W. Both her parents were scholars and authors, and she was brought up in the atmosphere of scholarship at Andover. At a very early age she showed capacity for authorship. She delivered a course of lectures at Boston Univ. 1876. In the advancement of women she has ever taken deep interest, and has also labored for the cause of temperance and social purity. She was married 1889. Apart from fugitive pieces and ephemeral contributions to journals, Mrs. W. has pub. about 30 separate works, all of which have received much popular approbation, while a few have circulated in an enormous number of copies. Of her work *Gates Ajar*, 20 editions were sold in the first year of its publication, 1868. Before the appearance of *Gates Ajar* she had pub. *Ellen's Idol* (1864); *Up Hill* (1865); *The Tiny Series* (4 vols. 1866-69); *The Gypsy Series* (4 vols.); *Mercy Gliddon's Work* (1866); *I Don't Know Her* (1867). Those which followed *Gates Ajar* are: *Men, Women, and Ghosts* (1869); *Hedged In* (1870); *The Silent Partner* (1870); *The Trotty Book* (1870); *Trotty's Wedding Tour* (1873); *What to Wear* (1873); *The Good Aim Series* (1874); *Poetic Studies* (verses) (1875); *Story of Avis* (1877); *My Cousin and I* (1879); *Old Maids' Paradise* (1879); *Sealed Orders* (1879); *Friends, a Duet* (1881); *Beyond the Gates* (1883); *Dr. Zay* (1884); *The Gates Between* (1887);

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Jack the Fisherman (1887); *Austin Phelps: a Memoir* (1891); *Fourteen to One* (1891). In collaboration with her husband, Herbert D. W., she has written *Come Forth* (1890); *A Lost Hero* (1891).

WARD, FREDERICK TOWNSHEND: soldier: 1831, Nov. 29—1862, Sep. 21; b. Salem, Mass. He was educated at the Salem high school; entered the French army, and served as lieut. during the Crimean war; was for some time in business in New York city, and was with Walker in Nicaragua. About 1860, during the Tae-ping rebellion (see TAE-PINGS), W. entered the service of the Chinese emperor, in which his success over the rebels raised him to the rank of admiral-general. He was mortally wounded at the head of his command in an assault on Tse-ki, near Ningpo. He was succeeded by Charles G. Gordon (q.v.), and 'Ward's force' was changed to 'Gordon's brigade.'

WARD, HENRY AUGUSTUS: naturalist: b. Rochester, N. Y., 1834, Mar. 9. He was educated at Williams College, and after a course of study under Louis Agassiz, in the Lawrence Scientific School of Harvard, became Agassiz's assistant. He studied zoology in Paris and mineralogy in Freiburg 1854; then travelled in Egypt, Nubia, Arabia, and down the w. coast of Africa. As mining engineer he has travelled much on the N. American continent and in Central America and the W. Indies. He was prof. of natural sciences in Rochester Univ. 1860-75. There he founded a laboratory for making plaster casts and fac-similes of objects of natural history for the cabinets of educational institutions. In the laboratory taxidermy also is practiced on scientific principles. W.'s *Catalogues* possess scientific value. He has pub. a *Notice of the Megatherium Cuvieri*, and *Description of the Most Celebrated Fossil Animals in the Royal Museums of Europe*.

WARD, JAMES: painter: 1769, Oct. 23—1859, Nov. 16; b. London. He learned the trade of an engraver; but turning to painting and adopting the manner of Morland, so closely imitated that artist's style that several of W.'s productions have passed for works of Morland. In the National Gallery, London, is his most admired painting—*Alderney Bull, Cow, and Calf*. He was elected member of the Royal Acad. 1811, and practiced his art till after the age of 80 years.

WARD, JOHN HENRY HOBART: soldier: b. New York, 1823, June 17; son of James W., soldier in the war of 1812, and grandson of John W., soldier of the revolution. He enlisted in the U. S. army at the age of 18, and reached the rank of sergt. major after 4 years' service. He served in the war against Mexico, participating in the siege of Fort Brown, in the battle of Monterey, where he was wounded, and in the capture of Vera Cruz. At the opening of the civil war he raised a regt. which he commanded at Bull Run and in the Peninsular campaign. He was made brig. gen. of vols. 1862, Oct. 4, and commanded a brigade in the 3d corps at Fredericksburg, Chancellorsville, Gettysburg, the Wilderness, Spottsylvania. He was wounded at Gettysburg and at Spottsylvania.

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WARD, JOHN QUINCY ADAMS: sculptor: b. Urbana, O., 1830, June 29. He studied and worked under Henry Kirke Brown, sculptor, in New York and Brooklyn, 1850-57. He then, in Washington, modelled busts of many public men—Joshua R. Giddings, Alex. H. Stephens, John P. Hale, etc. He opened a studio in New York 1861, and the same year produced his first full-length figure, a statuette, *The Freedman*, in bronze. This work, with the *Indian Hunter*, was exhibited at the Paris Exposition 1867. His figures, busts, groups, and statues, life-size, heroic, or colossal, are very numerous. Among his most notable works are: *Citizen Soldier* (colossal); *Shakespeare*; *Washington* (colossal); *Good Samaritan*; statues of Israel Putnam, Henry Ward Beecher, and numerous other notables; portrait busts of Valentine Mott, James T. Brady, Dr. Orville Dewey, etc.

WARD, MARY AUGUSTA (ARNOLD); known as Mrs. Humphry Ward: author: b. Hobart Town, Tasmania, 1851, June 11; granddaughter of Dr. Thomas Arnold, of Rugby; wife of Thomas Humphry W., author. At one time she was a diligent student of Spanish literature, and wrote for the *Dictionary of Christian Biography* many articles on Spanish subjects. Her first book was a children's story, *Milly and Olly* (1881). The novel *Miss Bretherton* (1884) made no stir in the world of letters or of reviews. Then she made and published an excellent translation of Amiel's *Journal Intime*. Her novel *Robert Elsmere* (1888) had the fortune to be reviewed by William E. Gladstone, and reached an enormous circulation: perhaps 1,000,000 copies were printed in England and the United States. It shows ability in disposing of the profoundest problems of man's nature and relations as a spiritual being by way of discussions among several remarkable people, which discussions are strung on a thin thread of story. She published *History of David Grieve* (1892); *Marcella* (1894); *Sir George Tressady* (1896); *Lady Rose's Daughter* (1903), etc. Mrs. W. was one of the founders (1890) of the institution known as University Hall, in the e. of London; here young men, graduates of universities, provide for the neglected population of the squalid quarter.

WARD, NATHANIEL: clergyman: about 1580-1652; b. probably in Haverhill, England. He graduated at Cambridge 1603, and was admitted to the bar. While travelling on the continent he was persuaded by David Pareus at Heidelberg to enter the Christian ministry, which he did, and was chaplain at Elbing, Prussia, for a time. Going back to England, he became rector of a country chh. in Essex 1628. He barely escaped excommunication by Laud, Bp. of London, 1631, for Puritanic non-conformity; he lost his living 1633, and, coming to America, was assistant minister of the chh. at Ipswich, Mass., 1634-5. He resided at Ipswich and employed his leisure in compiling for the general court of Mass. the *Body of Liberties*, a digest or code of the laws of the colony—a work that in spirit and in form is, writes Dr. Francis C. Gray, in the main far in advance of the time

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in which it was compiled. At Ipswich, W. also wrote, under the pseudonym Theodore de la Guard (exactly equivalent to his true name), *The Simple Cobbler of Agawam in America*—‘a tremendous partizan pamphlet, . . . full of fire, wit, whim, eloquence, sarcasm, invective, patriotism, bigotry’ (Moses Coit Tyler). Returning to England, W. was settled as minister at Shenfield, Essex, till his death. He published several polemic pamphlets.

WARD, SAMUEL: statesman: 1725, May 27—1776, Mar. 26; b. Newport, R. I.; son of Richard W. (1689–1763), who was colonial gov. of R. I. He was merchant and farmer at Westerly, R. I., for many years, and represented that town in the legislature; was appointed chief-justice 1761, gov. 1762; re-elected gov. 1765. He was the only one of the colonial governors who refused to take the oath to enforce the Stamp Act; again he was chosen gov. 1766, and persevered in resistance to the royal govt. He was member of the continental congress 1774–76. W. was one of the founders of the College of Rhode Island, now Brown University.

WARD, SAMUEL: soldier: 1756, Nov. 17—1832, Aug. 16; b. Westerly, R. I.; son of Samuel W. He graduated at Brown Univ. 1771; was capt. of a company of infantry at the siege of Boston 1775; served under Benedict Arnold in the expedition to Canada, and was taken prisoner. On his release he became maj. of a R. I. regt.; was in the action at Red Bank and at Valley Forge. He served in Gen. Sullivan’s campaign in R. I.; retired from the milit. service 1781, being then col. He was a merchant in New York 1790–1808, and then retired from business.

WARD, WILLIAM: English Bapt. missionary in India: 1769, Oct. 20—1823, Mar. 7; b. Derby. He became a printer, but having studied for the ministry was sent to India as a missionary-printer by the Eng. Bapt. Missionary Soc. 1799. He settled at Serampore, having been forbidden by the E. India Company to remain in Calcutta. He printed Carey’s translation of the New Test. into Bengalee, and various other translations and works by Carey and others issued from the mission press. He returned to Europe 1819, where he travelled for some time, and after a visit to the United States returned to Serampore 1821, where he died of cholera two years later. W. wrote an *Account of the Writings, Religion, and Manners of the Hindoos* (4 vols. 1811). In the 2d ed., 2 vols. 1818, the title was changed to *A View of the History, Literature, and Religion of the Hindoos*. In the 4th ed., 3 vols. London 1822, *Religion* in the title is changed to *Mythology*.

WARD, WILLIAM HAYES, D.D., LL.D.: orientalist: b. Abington, Mass., 1835, June 25. Having graduated at Amherst College 1856, he studied for a short time in Union Theol. Sem., New York; was tutor in Beloit Coll., Wis., 1857–8; then studied theol. at Andover Seminary, and there graduated, 1859. He ministered to Congl. churches in Kan. 1859–60, when he was ordained minister. Next

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he was teacher in Williston Sem., and in the Utica, N.Y., Free Acad., and prof. of Latin in Ripon Coll., Wis. He has been associate or superintending editor of the New York *Independent* since 1868. W. was chief of the Wolfe expedition to Babylonia 1864, and spent a year in exploring ruins s. of Bagdad. On the return of the expedition, he published an account of its labors in a pamphlet. He is author of many papers in the *Bibliotheca Sacra* on biblical criticism and Assyriology, and has contributed to the *Proceedings* of the Amer. Palestine Exploration Soc., the Amer. Oriental Soc., and the Amer. Archæological Soc. He wrote the biographical memoir prefixed to the *Poems* of Sidney Lanier, 1884.

WARD, WILLIAM THOMAS: soldier: 1808, Aug. 9—1878, Oct. 12; b. Amelia co., Va. He was educated at St. Mary's Coll., Lebanon, Ky., and began the practice of law. He served in the Mexican war as maj. of a Ky. regt. He then entered the Ky. legislature, and was representative in congress 1851–53. He was appointed brig. gen. of vols. in the Union army 1861, and organized a brigade. He was engaged in the pursuit of Gen. Morgan 1862; in Sherman's march to the sea he commanded a brigade in the 20th corps. He was brevetted maj.gen. 1865.

WARD'HOLDING: ancient military tenure of land in Scotland by which the vassal was bound to serve the superior in war whenever called on to do so. As the military duties of the vassal could not be performed when he was under age, the superior had a right both to the guardianship of his person and to the possession of his fee during his minority. An arrangement, however, was frequently made by which this right was commuted into an annual payment, in which case the fee was said to be held in *Taxed Ward*. W. was abolished by 20 Geo. II. c. 50; such fees as were held ward of the crown being converted into Blanch-holdings (q.v.), and those held of subjects becoming feu-holdings, a yearly sum being made payable to the superior, as a recompense for the casualties abolished.

WARD'IAN CASES: close glass cases placed on a trough containing soil, and accurately fitted to it; intended for growth of plants in the windows of apartments. They are especially adapted to ferns and those plants which require an atmosphere more moist than that of an inhabited apartment. They derive their name from W. B. Ward, of London, who was led 1829 to construct cases of this sort from observing a small fern and grass growing in a closed glass bottle in which he had placed a chrysalis covered with moist earth. To the success attending them the invention of *vivaria* for marine animals is with great probability attributed.

WARDLAW, *ward'law*, RALPH, D.D: most distinguished of Scotch Independent preachers and theologians: 1779, Dec. 22—1853, Dec. 17; b. Dalkeith. He was a Seceder by extraction, and studied in connection with the Associate Secession Church. Before he had completed his

curriculum, however, he became convinced that congregational independency was the scriptural system of church order. In 1800 he began to preach; and soon settled in Glasgow as pastor of a Congl. church. In 1811 he was appointed prof. of theology in the Glasgow Theol. Acad., which office he retained (40 years) with his pastorate (of 50 years) till his death. W.'s life was very laborious and earnest. Besides discharging faithfully and ably the duties of the pulpit and the professor's chair, he was a voluminous author, often involved in theological controversy, and prominent in the public religious and philanthropical movements of the day. His intellect was acute, his understanding sound, and his style remarkable for perspicacity, vigor, and grace. As a platform speaker he had rare power. The most important of W.'s works are: *Discourses on the Socinian Controversy* (1813); *Lectures on Ecclesiastes* (2 vols. 1821); *Essays on Assurance of Faith and on the Extent of the Atonement and Universal Pardon* (1830); *Discourses on the Sabbath* (1832); *Christian Ethics* (1833); *Discourses on the Nature and Extent of the Atonement of Christ* (1843); *The Life of Joseph and the Last Years of Jacob* (1845); *Congregational Independency* (1848); *On Miracles* (1852).—See *Life and Correspondence of Ralph Wardlaw*, by Dr. Alexander (1856).

WARDÖHUUS, *vär'dö-hös*: Norwegian seaport; at the e. extremity of Finmark, on the island Wardö or Vardö; protected by a fort, the most northerly fortification on the globe, 70° 23' 35" n. lat. and 48° 50' e. long. The climate is so severe that not even potatoes or barley come to maturity; and the few cows that are kept have sometimes to be fed on herrings.—Pop. 124, including the garrison of 24 men.

WARD'SHIP, in English Feudal Law: the guardianship which the feudal lord had of the land of his vassal while the latter was an infant or minor. Until the majority of the infant, the lord, out of the profits, provided a fit person to render the services incumbent on the vassal. See TENURE: WARDHOLDING.

WARD'S ISLAND: nearly circular island in the East river, between Randall's and Blackwell's islands: separated from Long Island on the s. and s.e. by Hell Gate, and from Randall's on the n. by Little Hell Gate; area 220 acres. It is used for charitable and penal institutions of New York, among them a home for invalid soldiers, a home for children, a homeopathic hospital, insane asylums for men and women, and a house of refuge. All these buildings are substantial, and some of them handsome structures.

WARE, a. *wär* [contr. of AWARE, which see (see WARY)]: on guard; on the watch (against something); aware; in *OE.*, cautious; wary: V. in *OE.*, to take heed of; to beware. WARE'LY, ad. in *OE.*, warily. WARE'LESS, a. *-lēś*, in *OE.*, incautious; unwary; suffered un-awares.

WARE, v. *wär*: a Scrip. spelling of WORE (see WEAR 2).

WARE.

WARE, n. *wär* [AS. *war*]: general name for seaweed—usually in expression **SEA-WARE**.

WARE, n. *wär* [Icel. *vara*; Ger. *waare*; Dut. *waar*, an article of merchandise]: an article of manufacture or merchandise, now usually in the plural **WARES**, *wärz*, goods for sale; merchandise; articles; commodities. *Ware* in the singular is a collective name for articles of a particular kind, usually specified by some adjunct relating to their materials or origin, or to the use to which they are put—e.g., *tin-ware*, *China-ware*, *table-ware*, *wooden-ware*, etc. **WARE'HOUSE**, n. *-hows* [*ware* and *house*]: a store for goods, either for safe-keeping or for sale: V. to place or deposit in a house for safe-keeping; especially, to place in the stores of government, previous to paying duty. **WARE'HOUSED**, pp. *-howzd*. **WARE'HOUSEMAN**, n. *-hows-män*, one who keeps a warehouse; man employed in or having charge of a warehouse (see below). **BONDED WAREHOUSE**, building in which duty-paying and excisable goods may be stored at a low charge, the tax or excise duty being levied on the whole, or the part, only at such time as the owner may choose to withdraw them. **WAREHOUSE RECEIPT**, receipt given by a warehouseman for goods or chattels delivered into his possession for storage. Such instruments, though technically not negotiable, have been made so in some states, inasmuch as they represent property, and may be assigned, the holder having as good a title as if the goods themselves had been delivered to him. See **WAREHOUSEMAN**, in Law: **WAREHOUSING SYSTEM**.

WARE, *wär*: town in Hampshire co., Mass.; on the Ware river, and on the Boston and Maine railroad; 25 m. n.e. of Springfield. It contains several churches, high school, public library, a widely-known cemetery, Aspen Grove, and 1 weekly newspaper. There are manufactures of cotton and woolen goods.—Pop. (1880) 4,817; (1890) 7,329; (1900) 8,263.

WARE, *wär*: small market-town of Hertfordshire, England; on the river Lea, here crossed by an iron bridge; 2½ m. n.e. of Hertford, 22 n. of London. The parish church is a handsome building in the Perpendicular style, dating in part from the 14th c., but frequently restored. Malting, for which there are several establishments, is the principal employment. There is a silk-mill employing 200 hands, and two large paper-mills. The famous Bed of Ware (see **BED**), referred to in Shakespeare's *Twelfth Night* (iii. 2), formerly stood in an inn in W., but has been removed to Rye House, 2 m. distant. Pop. (1881) 5,277; (1901) 5,000.

WARE, HENRY, D.D.: Unitarian minister: 1764, Apr. 1—1845, July 12; b. Sherborn, Mass.; descendant of Robert W., one of the first settlers in Dedham, Mass. He graduated at Harvard 1785; was pastor of a chh. at Hingham, Mass., 1787–1805, then becoming Hollis prof. of theol. at Harvard. His election to that post is memorable as having led to the controversy which resulted in the separation of the Unitarian from the 'Orthodox' Congregationalists. W. resigned his divinity professorship 1840, but continued

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for two years longer to act as prof. of pulpit eloquence. He published several vols. of sermons, theological tractates, and polemic pamphlets.

WARE, HENRY, D.D.: Unitarian minister: 1794, Apr. 21—1843, Sep. 22; b. Hingham, Mass.; son of Henry W. Having graduated at Harvard 1812, he was teacher in Phillips Exeter Acad. 1812–14; was ordained minister of a Unitarian chh. in Boston 1817. He was a leader in the Unitarian body, and, 1819–22, edited its newspaper organ, the *Christian Disciple*. He resigned his pastoral charge 1830, and was Parkman prof. of pulpit eloquence in the Harvard Divinity School 1830–42. He pub. *Hints on Extemporaneous Preaching; Formation of Christian Character*; memoirs of Joseph Priestley and others; sermons, essays, and poems.

WARE, WILLIAM: Unitarian minister and author: 1797, Aug. 3—1852, Feb. 19; b. Hingham, Mass.; son of Henry W. (1764–1845). He graduated at Harvard 1816, and at the Divinity School 1819; was pastor of the 1st Unit. Church, New York, 1821–36; at Waltham, Mass., 1836–7; editor of the *Christian Examiner* 1839–44; pastor of a Unit. church at West Cambridge 1844–5; travelled in Europe 1848–9. He was author of *Zenobia*, published first as *Letters from Palmyra*; *Probus*, afterward entitled *Aurelian*; *American Unitarian Biography*; and *Lectures on the Works and Genius of Washington Allston*.

WARE, WILLIAM ROBERT: architect: b. Cambridge, Mass., 1832, May 27. He graduated at Harvard 1852, and at the Lawrence Scientific School 1856; was prof. of arch. in the Massachusetts Institute of Technology 1865–81; and since 1881 has been connected with the School of Mines, Columbia College. In 1883 he published *Modern Perspective: a Treatise on Plane and Curvilinear Perspective*. He designed the American School of Classical Studies at Athens, Greece; the Union railway station at Worcester, Mass.; and, in conjunction with Henry Van Brunt, the Memorial Hall of Harvard University.

WAREHAM, *wär'ham*: ancient town of Dorsetshire, England; between the rivers Piddle and Frome; 14 m. e. from Dorchester. W. was a British town, and afterward a Roman station; and is surrounded by a British vallum or rampart of earth, which, though extremely ancient, is still about 30 ft. high, and is perfect on three sides. The chief trade is export of potter's clay; there are also breweries and brick-fields.—Pop. (1881) 6,102; (1891) 2,141.

WAREHOUSEMAN, in Law: person who for hire receives goods and merchandise or other chattels, to be stored in his warehouse. He is bound to use ordinary care in preserving the property placed in his care, his liability beginning as soon as the goods arrive and his hoisting apparatus is employed to take them into his premises. He has a lien on the goods for rent, services, etc. He may not make delivery to any but the legal holder of his receipt.

WAREHOUSING SYSTEM—WARFARE.

WAREHOUSING SYSTEM: plan for lessening the pressure of excise or customs duties by postponing payment of them until the goods that they are laid on pass to the consumer or to the retail dealer; warehouses for their storage—*bonded warehouses*—being provided by the government, the merchant paying a fee or rent for the custody of the articles stored. Bonding in this manner was part of the scheme of Sir Robert Walpole 1733, generally known as the Excise Scheme, which was defeated on account of its unpopularity. The system was first authorized in the United Kingdom by an act of George III. 1802. The warehousing system has also—by retaining the goods for the owner, whoever he may be—created a complete system of paper-money in the transference of the title-deeds, as they may be called, of such goods—the dock-warrants, warehouse-receipts, or other documents—whose possession is equivalent to possession of the goods; hence money may be advanced on such goods with as much ease and security as on bills of lading. The *Warehousing System* of the United States, established by act of congress 1846, Aug. 6, is substantially the same as that of Great Britain. By the act of 1854, Mar. 28, the system was extended by the establishment of private bonded warehouses.

WARFARE: see under WAR.

WARFIELD—WARHAM.

WARFIELD, BENJAMIN BRECKENRIDGE, D.D., LL.D.: 1851, Nov. 5— ————; b. Lexington, Ky.: educator and author. He graduated at Princeton Univ. 1871, and at Princeton Theol. Sem. 1876; studied at Leipzig 1877; was Presb. pastor for a short time at Dayton, O., then at Baltimore, Md., 1877-8. He was instructor (1878-87), and later prof. of N. T. lit. and exegesis, in the Western Theol. Seminary, Alleghany, Penn.; since 1887 prof. of didactic and polemical theology in Princeton Theol. Seminary. W. was managing editor with Dr. Charles A. Briggs (q.v.) of the *Presb. Review* 1889, and since 1890 managing editor of the *Presb. a. d Reformed Review*. Among his published works are: *The Divine Origin of the Bible* (1881); *Canon of the N. T.* (1892); *Gospel of the Incarnation* (1893).

WARFIELD, CATHARINE ANN (WARE): author: 1816, June 6—1877, May 21; b. Natchez, Miss.; daughter of Nathaniel Ware, of Mass. (1789-1854), and on her mother's side descended from Capt. Charles Percy, one of the early colonists of La. She was educated in Philadelphia, settled in O. with her parents, married Robert E. W., of Lexington, Ky., 1833. In association with her sister, Eleanor Percy Ware Lee (1820-49), she published two vols. of poems (1844,46). Mrs. W. herself wrote many romances, among them *The Household of Bouverie* (1860); *Romance of the Green Seal* (1867); *The Cardinal's Daughter* (1877).

WARFIELD, ETHELBERT DUDLEY, LL.D.: 1861, Mar. 16— ————; b. Lexington, Ky.: educator and author. He graduated at Princeton 1882; afterwards went abroad and took a post-graduate course at Oxford, subsequently studying in Germany. After his return to the United States, he graduated at the law-school of Columbia Univ., and was admitted to the bar 1884. In 1888 he was elected pres. of Miami Univ., Oxford, O.; and 1891 he was elected pres. of Lafayette College, Easton, Penn. In both institutions he has added to his duties as pres. the charge of the dept. of history. He published (1887) a historical sketch, *The Kentucky Resolutions of 1798*.

WARHAM, wawr'ham, WILLIAM: Archbishop of Canterbury: about 1450-1532, Aug. 22; b. at Church Oakley, in Hampshire. He studied at Winchester and at New College, Oxford. He qualified to practice law, became known to Henry VII., and was attached to an embassy to the court of Burgundy. Having taken holy orders, his services in relation to Perkin Warbeck's claim to the crown obtained for him rapid preferment in church and state; and he was soon bp. of London and lord chancellor (1502), and then primate (1503). He fell into disfavor with Henry VIII., and 1515 resigned the great seal to Wolsey. He was a close friend and favorer of the New Learning and of its apostles in England—Erasmus, Dean Colet, Grocyn, and Linacre. In regard to the divorce of Catharine of Aragon, he passively supported the king, and he agreed to recognize the king's supremacy. He was disposed toward some reforms in the church, in the same sense and measure as Erasmus was; but would

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never have become a 'Reformer,' as the word soon came to be understood.

WARINESS, WARILY, WARIMENT: see under **WARY**.

WARING, *wär'ing*, **GEORGE E.**: sanitary engineer: b. Poundridge, N. Y., 1833, July 4. He studied the science and art of agriculture with James P. Mapes; lectured through Me. and Vt. on agriculture 1855; became, 1857, agricultural and drainage engineer of the New York Central Park. In the civil war he served, first, in a 3 months' regt.; 1861, Aug., he was commissioned maj. of cavalry, and as such served under Gen. Fremont in Mo. Afterward he commanded, as col., a cav. regt. in the s.w. till the end of the war. In 1867-77 he was engaged in agriculture and cattle-breeding; from 1877 he practiced only as sanitary engineer. Col. W. pub. numerous books on agricultural science, cattle-breeding, drainage, sanitation, etc.; and executed important works of sanitary engineering at Memphis, Tenn., Newport, R. I., and elsewhere. In 1895, Jan. 10, he was appointed street-cleaning commissioner of the city of New York. He at once put upon strict business principles a dept. which had been a mere political engine, and had the streets effectually cleaned and kept clean. In 1898 he was chairman of a commission sent to Cuba to select sites for camps and to suggest plans for the sanitary improvement of the island. There he contracted yellow fever, of which he died, Oct. 28.

WARLIKE: see under **WAR**.

WARLOCK, n. *wawr'lök* [AS. *wærloga*, a breaker of his word or pledge—from *wær*, truth, and *loga*, a liar]: a sorcerer; a wizard. **WAR'LOCKRY**, n. *-rĭ*, the spells and magic practiced by a warlock.

WARM, a. *waworm* [Dan. and Sw. *varm*; Ice. *varmr*; Dut. and Ger. *warm*; OL. *formus*; Gr. *thermos*, hot: Skr. *gharma*, heat]: having heat in a moderate or gentle degree; having little or no winter, as a climate or region; zealous; ardent; easily excited or provoked; irritable; excited; flushed; enthusiastic; *familiarly*, easy and safe in money matters, as, 'he was deemed a *warm* man;' wealthy; in *paint.*, applied to colors that have yellow or yellow-red for their base; intimate, close, as *warm* friends: V. to impart heat to in a moderate degree only; to excite to ardor or zeal in; to animate; to make ardent; to grow less cold; to become moderately heated; to become warm or animated. **WARM'ING**, imp. **WARMED**, pp. *wawormd*. **WARM'ER**, n. *-ēr*, one who or that which warms. **WARM'LY**, ad. *-lĭ*, with gentle heat; ardently; with warmth; enthusiastically. **WARM'NESS**, n. *-nēs*, warmth. **WARMTH**, n. *wawormth*, state of being warm or ardent; gentle heat; earnestness or irritability—as applied to temper, 'he answered with much *warmth*;' fervor of mind; animation; in *paint.*, a tone of color arising from the use of colors expressive of heat, as reds, deep yellows, russet-browns, and the like. **WARM BATH**, a bath heated to nearly or a little over the tempera-

WARM-BLOODED ANIMALS.

ture of the human body. **WARM-BLOODED**, having warm blood; applied to animals with blood ranging in temperature from 98° to 112° F.; figuratively, warm-hearted; moved by generous impulses. **WARM-HEARTED**, a. sympathizing; cordial; sincere. **WARM-HEARTEDNESS**, n. warmth of heart; sympathy; cordiality. **WARMING-PAN**, a covered vessel containing hot coals or hot water for heating beds; a person put into a place or office until another person becomes eligible for it—he is then said ‘to keep it *warm* for him.’—**SYN.** of ‘warm. a.’: hearty; vigorous; sprightly; sincere; cordial; frank; candid; open; ingenuous; fervent; glowing; keen; violent; furious;—of ‘warmth’: glow; heat; zeal; ardor; fervency; cordiality; vehemence; eagerness; excitement.

WARM-BLOODED ANIMALS: those vertebrates which possess a four-chambered heart and spongy lungs; the heart and lungs being so arranged that the whole of the venous or impure blood is propelled over the large but closely packed capillary area of the lungs, by successive contractions of a special ventricle, receiving it from a distinct auricle (these being called the right or pulmonary ventricle and auricle), while the blood thus purified by the action of the air in the lungs is conveyed to another auricle, and propelled over the whole system by a second distinct ventricle (these being known as the left or somatic auricle and ventricle). The only animals which exhibit these structural peculiarities are mammals and birds. In man and in the ox the mean temperature of the interior of the body is 100° or a little less (see **TEMPERATURE OF THE BODY**); in the mouse it is 99° ; in the whale it is 103° . In birds it ranges, in different species, from 106° to 112° . The warm-blooded animals present, however, gradations of their heat-making power. In the hibernating animals there is commonly a loss of heat, of from 10° to 20° , during their winter sleep; and in the bat the temperature falls to 40° . In the cold-blooded animals, the fishes, amphibians, and reptiles, the temperature of the blood rarely exceeds that of the surrounding medium.—See **BIRDS: MAMMALIA: ANIMAL HEAT**.

WARMING AND VENTILATION.

WARMING AND VENTILATION: subjects closely connected in their relation to comfort and health.—WARMING.—A certain temperature, constant within narrow limits, is essential for the life of warm-blooded animals, and the heat by which this temperature is maintained is produced by the vital actions of the body itself: see ANIMAL HEAT: TEMPERATURE OF THE BODY. In the case of man, however, at least in ordinary climates, and in the civilized condition, the heat of the body, if allowed freely to escape, would be dissipated faster than it is produced; hence the necessity of clothing, houses, and other means of retarding its escape. To allow the body to continue depressed in temperature beyond the natural state, instead of hardening, infallibly weakens its vitality, and sows the seeds of disease. Statistical reports show that, exactly as the thermometer sinks, the rate of mortality rises, and certain fatal diseases become more prevalent: the vitality of the community decreases as the warmth of the atmosphere decreases. Thus the economy of heat is one of the primary elements in the art of living.

Where fuel is scarce, the resource against the cold of winter is thick clothing indoors as well as out. This is said to be the regular practice in China; and even in s. Europe fires are dispensed with in weather when we should think them absolutely necessary, and additional wrappings are considered as appropriate while sitting in the house as in the open air. But the preferable resource against cold is the artificial warming of apartments, which is the subject now to be treated. For the general principles as to generation of heat by combustion, and its diffusion, see COMBUSTION: FLAME: FUEL: HEAT.

The great aim, it may be premised, in all plans of warming is, as expressed by Dr. Arnott, '*to obtain everywhere on earth, at will, the temperature most congenial to the human constitution, and air as pure as blows on a hill-top.*' Warming and ventilation should not be antagonistic operations. The various plans of warming hitherto tried may be classed under six heads: The Open Fire, Stoves, Gas, Steam, Hot Water, and Hot-air Furnaces.

The Open Fire.—The Romans warmed their apartments chiefly by portable stoves or chafing-dishes, without any regular exit for the smoke and fumes; and a brasier of charcoal is still the chief means of heating sitting-rooms in Spain and Italy, which are in general without chimneys. The Chimney (q. v.) is a modern invention.

The open coal-fire glowing in a grate, cheerful and social in its influence and associations, has its most serious disadvantage in its waste of fuel. About one-half of the heat produced by a common fire goes up the chimney, while about a fourth of the heat which is radiated into the apartment is, in ordinary circumstances, carried into the chimney between the fire and the mantel-piece, and thus lost. It has been calculated that only about one-eighth part of the heat-producing power of the fuel used in common fires is realized, all the rest being dissipated into the surrounding atmosphere.

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Grates.—One improvement consists in diminishing the quantity of metal in immediate contact with the fuel, and forming the back and sides of the grate of fire-bricks. The bricks act like clothing, and keep in the heat of the coals, thus rendering the combustion more complete, and the fire far hotter; whereas iron, being a good conductor, passes the heat off into the wall, making the coals that touch it dull and black. Moreover, as radiation depends on the intensity more than on the quantity of heat, the same quantity of fuel burned in a brick-lined grate throws a greater proportion of that heat forth into the room.

When the sides of a fireplace are square with the back, none of the heat falling on them is given out again into the room; therefore the sides, or *covings*, as they are called, are inclined to the back at an angle of about 130° ; and sometimes they are made curved and of polished metal, to reflect the heat without absorbing it. It is questionable if simple brick slabs, placed at the proper angle, do not throw out more heat than the most splendid polished metal plates; for though the bricks do not reflect the rays of the fire, they become heated themselves, and then radiate their heat into the room. The rays of heat do not warm the air directly: it is when the rays from the fire fall on the floor, furniture, walls, or persons in the room, that they give out their heat; and the air, by coming in contact with these heated bodies, is gradually warmed.

The law that radiant heat neither affects nor is affected by the surrounding air explains the fact that an apartment may feel very cold though the air in it be at high summer heat. A church or other massive stone building may, in frosty weather, be filled with artificially heated air and yet retain its chilling effect for many hours. The warmth of the living body is lost in two ways: the film of colder air that touches it receives part of its heat by conduction, and rising up makes room for another film to do the same: a moderately heated body in cooling is robbed of about half its heat in this way. The other half is given off in rays, which pass through the air and impinge on the objects around. These objects are radiating back heat in return; but, their temperature being low, the return is small, and the warmer body is colder by the difference. Hence we are chilled by a cold wall or a cold window without touching it, and though the air between us and it may be at 70° .

The chief object of the grate is to present as large a surface as possible of glowing fire to the front. With this view, the grate is made long and deep, in proportion to its width from front to back.

The chimney-throat, drawing in a constant wide current of the warm air of the room, while it carries off heat, does very efficient service in ventilating the room; see CHIMNEY. A great quantity of heat indeed is carried off in combination with the hot gases, though no more air is allowed to enter a fire than is necessary for complete combustion. The proportion thus carried off is greatest in the case of fuel that burns with flame. Experiment shows that a fire

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of wood radiates one-quarter of its heat, the rest passing up; while the radiation from wood charcoal is one-half of the whole heat produced. Every one has felt that a *blazing* fire has far less warming effect than a glowing one: not that flame has not intense heat in it—more intense even than a glowing fire; but flame gives out heat by contact, not by radiation. Thus any mode of heating that depends on direct radiation, as the open fireplace chiefly does, involves great waste of fuel. This can be avoided only by applying the heat on a different principle; which consists in causing the fire to heat first certain apparatus with considerable surface, which then, by radiation and contact with the air of the apartment, diffuses its heat throughout it. This is the principle of the other methods of warming, which we proceed to describe. The consideration of methods that combine the two principles will follow.

Warming by Stoves.—A *close stove* is simply an inclosure of metal, brick, or earthenware, which is heated by burning a fire within it, and then gives out its heat to the air by contact, and to surrounding objects by radiation. The simplest, and, so far as mere temperature is concerned, the most effective and economical of all warming arrangements, is what is called the Dutch stove, which is simply a hollow cylinder or other form of iron standing on the floor, close at top, and having bars near the bottom on which the fire rests. The door by which the coals are put in being kept shut, the air for combustion enters below the grate; and a pipe, issuing from near the top, carries the smoke into a flue in the wall. If this pipe is made long enough, as by giving it, if necessary, one or more bends, the heated gases from the fire may be made to give out nearly all their heat into the metal before they enter the wall: thus nearly the whole heat of the combustion remains in the room. The chief objection to this form of stove is, that the metal is apt to become overheated, which has hurtful effect on the air. Part at least of the unwholesomeness of air highly heated arises from its excessive dryness; it parches and withers everything that it touches, like the African simoom. It must not, however, be supposed that this is peculiar to air heated by contact with metal: *air suddenly heated is always unwholesomely dry*. This is an important point. A cubic ft. of air, say at 32° , can contain a certain quantity of moisture and no more; but if heated to 80° it is capable of containing *five* times as much, and has thus become *thirsty*, and drinks up moisture from everything that contains any. The heating of air, therefore, does not dry it, in the sense of taking moisture from it; it only renders it greedier of more; and this is equally true whether it is heated by a stove or an open fire. The chief difference is, that with an open fire the warming is more gradual, and no part of the air becomes very highly heated; while the air that touches a metal plate heated near redness is all at once rendered intensely thirsty; and before its fierceness is tempered, by thoroughly mixing with the rest of the atmosphere of the room, it must be highly pernicious. But whenever

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the temperature within doors is much higher than without, the air is in a too thirsty state, and parches the skin and lungs, unless means be taken to supply the necessary moisture. Hence an *evaporating pan or like contrivance is an essential part of this kind of warming apparatus.*

All improvements on this simple form of stove aim at avoiding a high heat in the warming surface, chiefly by lining the fire-box with brick, and inclosing it in several casings, so as to enlarge the heated surface. In the kind of stove called a *cockle*, the fire is burned in a small furnace within the inner case, and the air is warmed by circulating between the inner and outer cases. When placed in the apartment to be warmed, the outer casing has perforations about the top for issue of the warmed air. For heating large buildings, the stove is placed in a separate furnace-room; and the warm air is conveyed to the different parts of the building in pipes or flues, while fresh air is drawn to the stove through a channel leading from outside the building to the openings in the outer casing.

In Russia, many parts of Germany, and other northern countries of Europe, the stoves are usually of brick, covered with porcelain. They are of the size of a large and very high chest of drawers, and usually stand in a corner of the room. The fire is burned in a furnace near the bottom, and the heated smoke is made repeatedly to traverse the structure from side to side, along a winding passage, before it reaches the top, where a pipe conveys it, now comparatively cold, into a flue in the wall. The heated mass of brick continues to warm the room long after the fuel is burned. As the people in those countries are not accustomed to such warmth in rooms as is usual in this country, it is generally considered sufficient to heat the stove once a day. The same quantity of wood burned in an open grate would be consumed in an hour, and would hardly be felt.

Warming by Gas.—A prejudice arose against gas as a medium of heat, from lack of skill in the first attempts to employ it. But when care is taken to carry off the products of combustion by a pipe, and to prevent overheating, gas stoves are economical and pleasant, and capable of being used in situations where a common stove is inadmissible.

In stoves, gas may be burned with the air or Bunsen burner, or with the luminous burner. The Bunsen burner consists of a small brass cylinder or chimney, set over the gas-jet like the glass of an argand lamp, with openings near the bottom to allow air to enter. The gas, being admitted into this before lighting, mixes with the air, and when lighted at the top burns with pale-blue flame: complete combustion and a smokeless flame are obtained in this way. Still, it must not be forgotten that there is burned air—a cubic ft. of carbonic acid, besides a quantity of watery vapor—for every cubic ft. of gas used; therefore, with the Bunsen or the luminous flame burner, these gaseous products should, wherever it is possible, be conducted away.

Steam and Hot Water.—The immediate warming agent

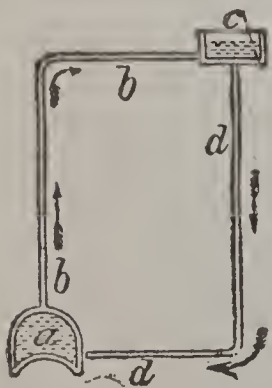
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in these two methods is the same as in the low-temperature stoves—viz., an extensive metallic surface moderately heated; but instead of heating these surfaces by direct contact with the fire, the heat is communicated first to water or steam, and thence to the metal of a system of pipes. This affords great facility in distributing the heat at will over all parts of a large building. Other advantages are freedom from dust and from risk of ignition of the material of the building.

Steam.—In steam-warming in establishments where steam-power is used, the same boiler and furnace serve both purposes. When steam enters a cold vessel, it is condensed into water, and at the same time gives out its latent heat till the vessel is raised to 212° , when the condensation ceases. The condensing vessel may be an iron pipe placed round the wall of the apartment near the floor. In admitting fresh air into the room it may be made to pass over this pipe, and thus be warmed. Radiators composed of tubing, or of hollow metal vessels, are in common use. The steam is conducted from the boiler by a smaller tube, which may be covered with list or other material, to prevent all condensation by the way; and the admission of the steam is regulated by a cock within the apartment, means being provided for allowing the air to escape. Allowance must be made for expansion of the tubes by heat; and they are so arranged that the condensed water is conveyed back to the boiler.

Hot Water.—Hot-water apparatus was applied as early as 1777 by M. Bonnemain, in Paris, to warm the hot-houses at the Jardin des Plantes, as well as for the artificial hatching of chickens. It was introduced into England by the Marquis de Chabannes 1816, and is now very extensively used. One of its advantages is that the heat begins to be distributed, in some degree, as soon as the fire is lighted, while with steam apparatus the whole of the water must be at boiling-heat before any steam enters the pipes.

There are two kinds of hot-water apparatus—high-pressure and low-pressure. In the first the water is confined, and can be heated to any degree; in the other it is open to the air, and cannot be heated above 212° . The figure shows the way in which water is made to carry the heat of a furnace to any part of a building by the

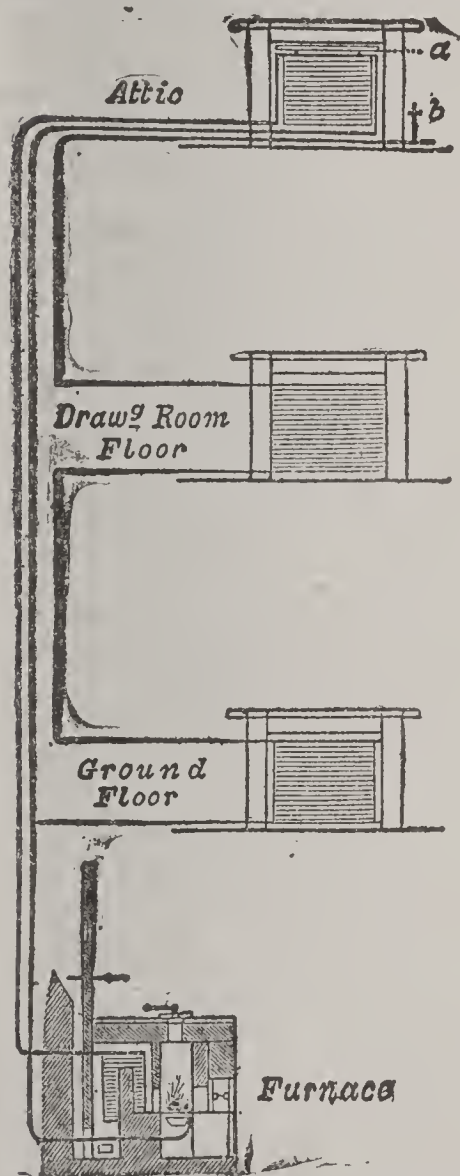


low-pressure method: *a* is a boiler, from the top of which a tube issues, and after circulating through the building re-enters near the bottom. At the top of the circuit there is a funnel, or a small cistern, *c*, by which the tubes and boiler may be kept full. When the fire is lighted at the bottom of the boiler, the heated portion of water, being lighter than the rest, rises toward the top through the tube, *bb*, while the colder water from *dd* flows in to take its place. The tube is made to traverse the apartments to be warmed, where it gives out its heat to the air; the returning portion of the pipe is

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thus always colder, therefore heavier than the other, so that the circulation is constantly kept up. The warming surface is increased, wherever it is necessary, by coiling the pipe, or by making expansions upon it of various forms, constituting water-stoves.

To avoid the necessity of so large a surface, and such a mass of water as is required at the low temperature the water attains in the pipes of this kind of apparatus, the high-pressure system was introduced. In this the pipe is



made comparatively small, but very strong, and is formed into an endless circuit cut off from the atmosphere. The water is heated by making a number of coils of the pipe itself pass through the furnace; and as the whole circuit forms a shut vessel, as it were, the temperature may be raised to 300° and upward, according to the strength of the pipes. This high temperature causes a rapid circulation. A compendious specimen of the apparatus, calculated for a house of three stories, is presented in the accompanying engraving. In filling the tube with water, which enters at *b*, care is taken to expel all the air; and at *a* there is an expansion of the tube, equal to 15 or 20 per cent. of the capacity of the whole, which is left empty both of water and of air, to allow for expansion of the water when heated. The arrangement of the pipe may be various: the plan generally followed is to place a considerable

coil of it within a pedestal or bunker, with open trellis-work in front, in a convenient part of the room. It may be made also to wind round the room, behind the skirting-board, which, being perforated with holes, will allow the entrance of the warmed air.

Hot-air Furnace.—This system is an excellent one when properly carried out. The fire warms the exterior of a system of flues or pipes of wrought or cast iron. The pipes are cased in a chamber of masonry or sheet-iron. From the chamber pipes of large area (30 sq. in. or more) are carried to the places to be heated. The chamber communicates also by a large flue, the air-box, with the open air. In action the furnace, which must be at the lowest point in

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the structure, is heated by a coal or wood fire. The air heated rises from its casing through the flues to the rooms above it, and fresh air from outside enters by the air-box, to be heated and delivered as the first was. Thus a constant stream of fresh warmed air is delivered to the apartments. A very usual practice is to have a small water-tank to supply moisture to the air.

Indirect Radiation.—The hot-air furnace heats by what is called indirect radiation. If we substitute for the furnace a set of steam or hot-water pipes within the air-chamber of brick or iron, leaving the other arrangements as above described, we have one of the most approved systems of steam or hot-water heating—one which does not heat the same air over and over again, but which delivers fresh air continually into the rooms.

Conservation of Warmth.—The art of warming embraces not only the production and distribution of heat, but the construction of apartments with a view to prevent its escape. The way to effect this—setting aside meanwhile the necessity of renewing the air—is, in the first place, to make the walls, floor, windows, doors, etc., as impervious to air as possible, to prevent the heat from being carried off by currents; and in the next place, to make them poor conductors of heat. For this last purpose, the walls ought to be sufficiently thick, and, if possible, of non-conducting materials. Solid iron would make a cold wall; wood, a warm one; and in this respect brick or porous stone is preferable to hard stone. But the chief element for a warm wall is that it be *double*, which every wall in effect is when it is lined by a coating of plaster, kept apart from the wall itself by the laths. The plate of confined air between the two is the most effectual barrier to the passage of the heat outward. By making iron walls double or cellular, with a lining of plaster, they might be prevented from discharging the heat. Windows are a great source of cold, not so much by admitting cold air as by allowing the heat to pass by conduction through the thin glass. The air of the room that touches the window is robbed of its warmth, and is constantly descending in a cold stream toward the floor: thus a cold influence is felt from a window, however tight it is. This is partly arrested by window-blinds, shutters, and curtains, which check the flow of the air, and retard its carrying power. But a far more effectual plan is to have double windows—either two frames, or double panes in the same frame. The loss of heat by a double window is said to be only one-fourth of that by a single. Double windows are considered essential in countries where the winters are rigorous. They necessitate extra provision for ventilation. It is evident that we might succeed in nearly imprisoning the heat, and thus produce a house of ideal perfection, as concerns mere temperature. But for the habitation of living beings, another condition, seemingly antagonistic to the former, is no less requisite—‘air as free as that on a mountain-top.’ In general practice the two conditions are sought not so much to be reconciled as compromised; and then, as usual, neither object is well attained.

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Circulation of air is got accidentally, through the imperfections of structure in our rooms—through the chinks and bad fittings of the windows, doors, floors, and the uneconomical fashion of our fireplaces. Were houses much better constructed than they are, the inmates would in many cases be suffocated outright, as they now often partially are. The airing of houses should not be left to chance, but be in every case secured by special ventilating apparatus capable of direct control.

VENTILATION.—The necessity of constantly renewing the air wherever living beings are breathing arises chiefly from the effects produced on air in the lungs (see **RESPIRATION**). The average quantity of carbonic acid in expired air or breath is found to be 4·3 per cent. by measure. Now this gas, when taken into the lungs, is a poison, and tends to arrest the vital processes. Like other poisons, however, it can be rendered harmless by *dilution*. The small proportion naturally existing in the atmosphere is perfectly innocuous, and may be considerably increased without sensible effect. But it is decidedly prejudicial to breathe for a long time air containing 1 measure in 100 of carbonic acid; and it is considered desirable that the proportion should never exceed 1 in 500. We may assume, then, what is near the truth, that 20 cubic ft. of air pass through the lungs of a man in an hour. To reduce the poison of this to 1 per cent., at which point it is barely respirable, it is requisite to mingle it with as much fresh air as will make a mixture of nearly 100 cubic ft.; and to make the dilution at all safe, it must be carried five times as far. In other words, the respiration of one human being vitiates hourly about 500 cubic ft. of air. In addition to carbonic acid, expired air contains an undue amount of watery vapor. Minute quantities of animal matters also are exhaled with the breath; and these in close ill-ventilated apartments form a clammy deposit on the furniture and walls, and, by putrefying, become organic poisons.

A further necessity for constant renewal of fresh air arises wherever lights are burning. The deteriorated air of a fire goes off by the flue, but lights are burned in many places where the products must mingle with the atmosphere of the apartment. Now, every cubic ft. of gas consumes the oxygen of 10 ft. of air, and forms at least 1 ft. of carbonic acid, besides watery vapor, sometimes mixed with sulphurous fumes.

To counteract these various sources of pollution, and keep the air fresh and wholesome, it is found in practice that on an average about 20 cubic ft. of fresh air per minute for each individual must be supplied. Ventilation consists of two operations—removal of foul air, and introduction of fresh air. Though neither operation can go on without the other, it is convenient to consider the two separately.

The agents employed in removing the air from apartments are chiefly two: that by which nature effects the ventilation of the earth on a grand scale—viz., the draught of ascending currents produced by difference of tempera-

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ture; and mechanical force, such as pumping. The former is the only one readily applicable in structures not of great size. The column of air in the chimney of a lighted fireplace, being expanded and comparatively light, exerts less than the prevailing pressure on the air immediately under and about its base: the air, therefore, below and around it pushes it up, and flows in to take its place; the velocity of the movement being in proportion to the height of the chimney and the degree of heat. Thus, though it is often convenient to speak of the air being *drawn* or *sucked* into the chimney, the force does not lie in the chimney, but in the greater pressure of the air behind. Wherever, then, there is a heated chimney, there is a means of removing the foul air. And in rooms moderately lofty and spacious, with windows and other fittings not closer than usual, and a chimney-mouth of the usual width, there is practically no risk, when there is no throng of inmates, of any serious vitiation of the air. The heated breath that ascends to the ceiling has time to diffuse itself gradually, and to be drawn in a diluted state into the currents setting from all quarters toward the chimney. These currents, however, are one great objection to this mode of ventilation, as they consist in great part of cold air that has just entered by the doors and windows, and are strongest where the inmates sit to enjoy the fire.

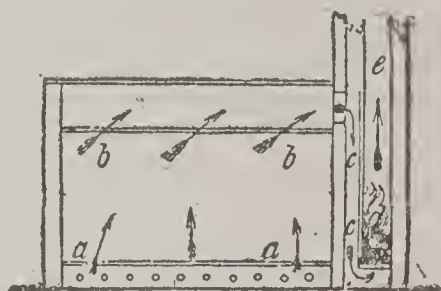
The ascent of foul air to the top of the room dictates its exit in that direction, rather than low down at the mouth of the chimney. It is conceived by some that the carbonic acid of the breath, from its greater weight, must be chiefly at the bottom of the room; but this is a mistake. The heated breath ascends instantly, because it is, as a whole, lighter than the air around it; and the carbonic acid in it does not tend to separate from it and fall down by its superior weight, but, by the law of the diffusion of gases, seeks to spread itself equally all over the room, and would do so though it were lying at first on the floor. Therefore a ventilating-valve has been contrived, as a desirable supplement to the open-fire draught in small and crowded apartments, and as an essential for healthfulness where the fire is burned in a stove or a closed grate. An aperture is cut in the wall over the chimney, as near the ceiling as convenient. In this aperture is suspended a valve, capable of opening inward to the chimney, but not outward to the room, by which means a return of smoke is prevented. The valve is so balanced on its centre of motion that it settles in the closed position, yet is easily opened. Where there is good chimney-draught, a flap of 36 sq. in. is sufficient for a full-sized room with company. This apparatus may be painted or otherwise made ornamental. It operates by virtue of the draught in the chimney. Whenever that is active from the presence of a fire, the valve is seen to open inward, and a stream of air from the top of the apartment passes through into the chimney: the operation is equivalent to the stream of air always passing into a chimney between the fire and the mantelpiece, but has the great superiority of draining off the most impure air in the room.

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A wire descends to a screw or peg fixed in the wall, by which the opening of the valve may be limited or altogether prevented. This is a far more efficient plan of ventilation than an open window, or an opening in the wall near the roof, leading merely to the outer air; for where there is an open fire in the room, such openings rather admit a rush of cold air than let out the foul.

There is often more or less draught in a chimney even without a fire, from the air within being slightly warmer than that without; and this action might be strengthened or procured by burning a jet of gas within the ventilating-aperture. Where a house is to be built new, it is advantageous to have special ventilating-flues in the walls, separate from but close to the fire-flues, so that the air may be heated, and an ascending current produced. When fires are not required, the draught can be maintained by gas-jets at the entrances to the vents. This plan of causing a draught by gas is applicable to apartments without fireplaces. Where a fire is burned for the express purpose of producing a current of air, it is called ventilation by *fire-draught*. The plan has been successful in mines.

Many of our large buildings are ventilated by fire-draught. The figure shows an arrangement by which a school, church, or public hall may be ventilated: *aa*, the flooring perforated with holes, through which air, warmed by hot-water pipes, passes to the interior. The ceiling, *bb*, is perforated, leading to a chamber which communicates with a vertical flue, *cc*; which leads to the fireplace of the warming-apparatus, situated at the foot of a flue, *ed*. As the only air which reaches this must pass from *cc*, a constant current is maintained therein, also through the apertures in the ceiling.



In many instances the apparatus provides as well for admission as for removal of air. In ordinary dwellings no special provision is in general made as to admission. It is, in fact, not absolutely necessary; for the removal of a portion of the air of a room never fails to secure the entrance of a fresh supply somewhere. Whenever the chimney-draught or other means removes a little of the pressure inside the room, the pressure without forces air through every opening and chink; and even, were there no actual openings, would force it through the porous substance of the structure. But this irregular source of supply has various inconveniences. It often requires more force to strain the air in this manner than the draught possesses, and then the chimney smokes; it is smoke produced by this cause that is curable by opening the door or window. Another and great objection is, that impure air is often thus drawn into rooms from the lower parts of the building and from drains about the foundation. Therefore there ought in all cases to be a free though controllable

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entrance provided for fresh air; and this entrance should be independent of the windows. It is disputed as to where in a room the air should be made to enter—some advocating openings for it near the floor, others near the ceiling; and neither method has yet been rendered unobjectionable. One essential is, to prevent the air from rushing in with a strong current, by passing it through minute holes spread over a large space. A tube, e.g., may lead from the outer air to a channel behind the skirting, or behind the cornice, and the air be allowed to enter the room through minute holes, or through a long, narrow, and concealed opening covered with perforated zinc or wire-gauze: the passage or tube leading from outside the wall can be more or less closed by a valve regulated from the inside.

Ventilation by Fans and Pumps.—The fan-wheel has been for many years used in factories, to which particularly it is applicable as being readily kept in motion by the engine. The air is drawn in at the centre of the wheel, and flies off at the circumference by centrifugal force. The fan is placed at the top of a flue, into which branches from all parts of the establishment proceed; and when it is set in motion, it draws off the air from every apartment communicating. To obviate waste of power by 'wire-drawing' the air—i.e., by making it squirt through small valves or other narrow openings—a ventilating-pump has been invented, requiring no other motive-power than the descent of the water used in the establishment from a high reservoir to the lower parts of the building.

Transference of Heat from the Used Air to the Fresh.—This is the kind of economy practiced in the Respirator (q.v.) and in the Caloric Engine (q.v.). Whatever difficulties—or impossibilities, as some maintain—there may be in the way of turning this transferred heat into a fresh source of power, nothing seems simpler, in theory at least, than to economize heat in this manner for the warming of dwellings and similar purposes. We are not aware that the principle has been developed in practice; but the possible economy of heat is obvious, and it requires only mechanical ingenuity to realize it.

It is evident how desirable it would be to do the same with the impure heated air which should be ejected from dwellings. Where the ventilation depends on the draught of a common chimney, it seems impossible to bring the entering air in contact with that which is escaping; but where the mechanical force of a pump or a fan is employed, nothing seems simpler than to make the two currents run counter to one another for a certain distance in close contact through a system of tubes. The smoke even, which, with the most economical arrangements, still issues from the flues at a temperature considerably above that of the building, might be drawn into the current with the foul air of the apartments, and the whole reduced nearly to the temperature of the atmosphere before being allowed to escape. Of course there must be loss in the transference; but a large percentage would be saved, and the consumption of fuel would be reduced by that amount. Were this

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‘double-current ventilation’ applied to churches, ball-rooms, theatres, etc., where thousands of persons are assembled, Dr. Arnott believed that ‘no other heating apparatus would be required but the lungs of the company.’

Public Heat Supply.—It is evident that household fire heat is manufactured on a very small scale; and experience has proved that the cost of production of an article is always inversely proportionate to the scale of its manufacture. Accordingly it has been suggested to supersede domestic fires, and to lay on heat (heated air or steam), or the means of generating heat (low-priced gaseous fuel) to houses much as we now lay on gas. The public supply of heat to houses through a system of steam-pipes laid in the streets—the steam being generated at a great central boiler provided for each local district—has been introduced and is in operation in some cities in this country. It has been proposed, further, to abate the smoke-nuisance and effect thorough ventilation on a similar joint-plan, by connecting the chimneys of all the houses with underground culverts, provided at intervals with high shafts, in which, if necessary, the draught upward might be increased by furnaces. It has been suggested that we have long been familiar with extensive manufactories, covering large areas, in which are very numerous fires, all in communication with a single lofty chimney; and that in building a new street it might easily be made to empty its entire smoke through the medium of a single tall tower resembling mediæval campanili seen in Bologna and other Italian cities.

WARMINSTER, *war'win-stér*: ancient town of Wiltshire, England; on the w. border of Salisbury Plain; 19 m. n.w. of Salisbury, 105 m. s.s.w. of London by rail. The parish church dates from the reign of Henry III.; and there are numerous interesting edifices in the town and neighborhood. An important corn-market is held every week.—Pop. (1871) 5,786; (1881) 5,640; (1891) 5,562.

WARN—WARNER.

WARN, *v.* *wawrn* [AS. *warnian*, to warn, to take heed—from *wearn*, an impediment, an obstacle: Icel. *varna*, to forbid, to refuse: connected with the root *ware*, to look or take notice]: to give notice to; to cause one to take notice; to put on guard against danger; to admonish of any duty; to caution. **WARN'ING**, *imp.*: N. caution against danger; previous notice, as from landlord to tenant to quit a house, etc. **WARNING**, in *Scotch law*, notice to the effect that the relation of master and servant, or of landlord and tenant, will terminate at a specified time; corresponding respectively to the *notice to leave* and *notice to quit* of other jurisdictions. **WARN'INGLY**, *ad.* **WARNED**, *pp.* *wawrnd*.

WARNER, *wawr'nér*, CHARLES DUDLEY: author: b. Plainfield, Mass., 1829, Sep. 12. He graduated at Hamilton College 1851, and while a student contributed articles to magazines. He was employed as member of a surveying party on the Missouri river 1853-4; then studied law in the Univ. of Penn., graduating 1856; practiced law in Chicago 1856-60; edited the *Press* in Hartford, Conn., 1861-67; the paper was then consolidated with the *Hartford Courant*, and W. became associate editor. While travelling in foreign countries, 1868-9, he was correspondent of the *Courant*, and his letters were much admired. While associate editor of the *Courant*, he became co-editor of *Harper's Magazine* 1884, in which he published *Studies in the South; Mexican Papers*; and *Studies in the Great West*. Mr. W. took special interest in social problems, particularly in prison management. He earnestly advocated enlargement of the courses of instruction in colleges, and improvement of educational methods. His style is graceful and felicitous: his writings show an observant eye and a discerning thought; and a moral earnestness is often traceable under his guise of playful words.—Besides the works above mentioned. W. pub. *My Summer in a Garden*, collection of the author's comments on the foibles of society (1870); *Saunterings* (1870), record of travel; *Black-log Studies* (1872); *Baddeck and That Sort of Thing* (1874); *My Winter on the Nile* (1876); *In the Levant* (1877); *Capt. John Smith* (1881); *Washington Irving* (1881); *Roundabout Journey* (1883); *Their Pilgrimage* (1886); *On Horseback* (1888); *As We Were Saying* (1891); *Our Italy* (1891); *The Work of Washington Irving* (1893); *As We Go* (1894); *The Relation of Literature to Life* (1896); *The People for Whom Shakespeare Wrote* (1897); *The Golden House*, etc. He was, with Mark Twain, co-author of *The Gilded Age* (1873); editor-in-chief of *Library of the World's Best Literature* (1896-7). He died 1900, Oct. 10.

WAR'NER, OLIN LEVI: sculptor: b. Suffield, Conn., 1844, Apr. 9. In early life he was a telegraph-operator, but in 1869 went to Paris and for three years studied under François Jouffroy at the École des Beaux Arts. In 1877 he was elected a member of the Soc. of Amer. Artists, and 1888 an associate of the National Acad. Among his works are *Diana, Dancing Nymph*, statuettes of *May* and *Twilight*, and a portrait statue of William Lloyd Garrison. He d. 1896, Aug. 14.

WARNER—WARP.

WAR'NER, SETH: soldier: 1743, May 17—1784, Dec. 26; b. Roxbury, Conn. He removed to Bennington, Vt., 1765; became a leader of the people in the disputes with New York concerning the 'New Hampshire Grants,' and was outlawed by New York. He served in the revolutionary army; was second in command to Ethan Allen in the capture of Ticonderoga and commanded the forces that took Crown Point two days later—for this service congress commissioned him a col.; he accompanied Montgomery's expedition into Canada; commanded at the sharp engagement at Hubbardton; took part in the battle of Bennington, repelling the reinforcements of the enemy. He remained in the service until 1782, when failing health compelled him to resign his commission. He returned to Roxbury, Conn., where he died.

WAR'NER, SUSAN: author: 1819, July 11—1885, Mar. 17; b. New York; daughter of Henry W. W., a New York lawyer and writer. Under the name Elizabeth Wetherell she published 1851 her first and most popular novel, *The Wide, Wide World*, which had an immense circulation; *Queechy* followed 1852; then *The Law and the Testimony*, *The Old Helmet*, *Melbourne House*, and many others. In collaboration with her sister, she wrote *Say and Seal* (1860). Her works have been translated into German, French, and Swedish. She died at Highland Falls, N. Y.—Her sister **ANNA BARTLETT W.** (b. New York 1820), under the *nom de plume* Amy Lothrop, has pub. *Dollars and Cents*, *My Brother's Keeper*, *Mr. Rutherford's Children*, *The Other Shore*, *Carl Krinken*, and with her sister *Say and Seal*.

WARNER'IA: see **HYDRASTIS**.

WAR OFFICE: in the United Kingdom, office of the sec. of state for war, and the centre on which pivots the entire administration of the army; corresponding to the War Department (q.v.) of the United States. It is divided into three great departments—the Military, the Ordnance, and the Finance—under the officer commanding in chief, the surveyor-gen. of the ordnance, and the financial sec., respectively. All are ultimately responsible to the sec. of state for war, who has, for his immediate assistance, one parliamentary and one permanent under sec. of state: see **SECRETARY OF STATE**, in the Eng. Government.

WARP, v. wawrp [Goth. *wairpan*; AS. *weorpan*; Icel. *verpa*; Ger. *werfen*, to throw, to take a certain turn: Icel. *varpa*, to cast or lay out a net]: to cast; to throw; to give a cast or twist to; to twist or be twisted out of a straight direction; to turn from a straight or proper course; to turn aside from the true direction; to pervert; to prejudice; to tow or move, as a ship to a place by means of a rope laid out for that purpose and fastened to an anchor; to inundate low-lying lands for the purpose of fertilizing them with the earthy matters held in mechanical solution by the water (see **WARPING**); to drop young prematurely, applied to cattle: N. the long threads laid out parallel to each other between which the woof is shot in weaving; the threads lengthwise in a woven fabric, the cross ones being called

WARPING—WARRANT.

the *woof* or *weft*; a rope laid out for the purpose of mooring a ship; a tow-line; muddy deposit *cast* from waters artificially introduced over low lands. **WARP'ER**, n. *-ér*, one who prepares the warps of webs for weaving. **WARP'ING**, imp.: N. act of one who or that which warps; a turning aside from the true direction. **WARPED**, pp. *wawrpt*. **WARP'AGE**, n. *-áj*, the act of warping.

WARP'ING: mode of improving barren low-lying lands by inundating them with the water of rivers which bring down large quantities of mud. It is practiced in some valleys of the Alps; and the rich soil brought down from the mountains is thus arrested and made to increase the fertility of fields. It is also practiced on a large scale in England, on the tidal waters of the Ouse, Trent, and other rivers falling into the Humber, where the name *warp* is given to the large quantity of earthy particles held in suspense by the tidal waters, and where by means of large canals, embankments, and flood-gates, much land previously sterile and worthless has been covered with good soil, and has become very productive. (In these rivers it is not the waters coming down in floods that bring valuable sediment, but the tidal waters.) The 'compartment' which is embanked around, preparatory to warping, is generally 50 acres or less, the farmer warping only one field in a season. In some cases, however, 500 or 600 acres have been warped in one piece.

WARRANTICE, n. *wör'än-dís* [see **WARRANT**]: in the law of Scotland, obligation to indemnify the grantee or purchaser of land if, by defect of title, there should be an evictive or paramount claim established against the lands.

WARRANT, v. *wör'ränt* [OHG. *warjan*; Ger. *wehren*, to protect: Low Ger. *warent*, one who gives security: OE. *warant*, a protector: OF. *guarant*, one who makes safe: OHG. *wara*, care (see also **WARY**): to protect; safeguard; secure; to guarantee against harm or the like; to give a pledge or assurance in respect of something, as that goods sold are genuine and of the quantity, quality, etc., represented; to authorize; to justify; to maintain by authority; to assure; to declare with confidence: N. written document conferring some right or authority; that which authorizes or justifies an act; that which vouches for or insures anything; attestation; guarantee; right; legality; authority; authorization: legal instrument, sometimes called a *writ*, issued by a judge, justice of the peace, or the like, enjoining or authorizing the person to whom it is addressed to seize or detain the person, persons, or things specified in it, or to do some other specified act, as to search a house, a ship, etc. (see **WARRANT OF ARREST**). **WAR'RANTING**, imp. **WAR'RANTED**, pp. **WAR'RANTER**, n. *-ér*, one who warrants. **WAR'RANTOR'**, n. *-änt-ör'*, one who warrants, as opposed to **WAR'RANTEE'**, the person to whom title or the like is warranted. **WAR'RANTABLE**, a. *-ä-bl*, authorized by commission or right; justifiable; defensible. **WAR'RANTABLY**, ad. *-bli*. **WAR'RANTABLENESS**, n. *-bl-nēs*, the quality of being warrantable or justifiable. **WAR'RANTIZE**, n. *-iz*,

WARRANT—WARRANTY.

in *OE.*, authority; security: V. in *OE.*, to warrant. WAR'RANTY, n. -i, a guarantee; a security; an engagement, expressed or implied, that certain things or facts are or shall be as they have been represented or promised to be (see below): in *insurance law*, certain stipulations or engagements by the party insured; in *OE.*, authority; guarantee: V. to guarantee. WARRANT-OFFICER, a non-commissioned officer acting under a warrant from a govt. department, or considered as so acting, instead of acting under commission from the chief executive power: such officers in the navy are gunners, boatswains, carpenters, and sail-makers (see NON-COMMISSIONED OFFICERS, in the Army). SEARCH-WARRANT, written document authorizing a person to enter a house, a shop, etc., usually for stolen goods. DOCK-WARRANT, a custom-house license or authority.

WARRANT OF ARREST: legal instrument, sometimes called a *writ*, issued by a justice of the peace or other authorized officer for the capture, apprehension, or arrest of a person on a criminal charge: seizure of a person on a writ in a civil cause is an 'arrest,' and the writ is a 'W. of arrest,' or an 'order of arrest.' The term arrest is, however, generally used for capture of a person on a charge of any kind, by an authorized officer: see ARREST, in Law. The W. must be dated and bear the signature and seal of the justice or other officer issuing it; and a general W.—i.e., a W. to arrest all persons suspected, without naming or describing any individual—is illegal and void for uncertainty—vague suspicion not being enough to deprive any man of his liberty.

WAR'RANT OF ATTOR'NEY, in Law: authority given by a debtor to some attorney to appear in court and enter judgment against him in any action that may be brought to recover a particular debt. It is generally given by a debtor when he finds that he has no defense and wishes to gain time; and if he do not carry out his promise, the effect is that the attorney can immediately sign judgment and issue execution against him, without the delay and expense of an ordinary action. The W. of atty. is a security given to the creditor: in virtue of it the creditor may sign judgment and issue an execution; nor need he wait for the termination of the suit. But the force of the warrant is exhausted when one judgment is entered: a second judgment on the same warrant is void.

WAR'RANTY, in Law: a promise or covenant to warrant or secure against all men to a certain person the enjoyment of the thing granted or sold to him. As applied to ordinary sales of things personal, W. is used to secure the truth of certain representations which the purchaser has no means, or has imperfect means, of ascertaining, yet whose knowledge is material to the contract. The law does not imply on the part of the seller of an article in its natural state, who has no better means of information than the purchaser, and who does not affirm that the article is fit for any particular purpose, any W. or undertaking beyond the ordinary promise that he makes no false repre-

representation calculated to deceive the purchaser, and practices no deceit or fraudulent concealment, and that he is not cognizant of any latent defect materially affecting the marketable value of the goods. In the ordinary sale of a horse, the seller warrants it only to be an animal of the description that it appears to be, and nothing more; and if the purchaser makes no inquiries as to its soundness or qualities, and it turns out unsound and restive, or unfit for use, he cannot recover as against the seller, as it must be assumed that he purchased the animal at a cheaper rate. And on the sale or transfer of wares and merchandises, if nothing is said as to the character or quality of the thing sold, the buyer takes the risk of all latent defects unknown to the seller at the time of the execution of the contract of sale; all that the seller answers for being that the article is, as far as he knows, what it appears to be. Whenever a man sells goods as owner, he impliedly undertakes and promises that the goods are his own goods, and that he has a right to make the sale and transfer which he professes to make; and if he was not the owner, he is responsible in damages if the real owner claims them from the purchaser. If the purchaser does not himself inspect and select the subject-matter of sale, the seller impliedly warrants the article that he sells to be the very article that the purchaser has agreed to buy, and is responsible in damages if he furnishes a different article. If the vender is told that the article is wanted for a specific purpose, then he is taken to warrant impliedly that the article furnished is adequate for that purpose. Every victualer or dealer in provisions impliedly warrants them to be wholesome and fit for food. But a private person who does not trade in provisions is not responsible for selling an unwholesome article of food without fraud and in ignorance that it is unfit to eat. Where buyer and seller have equal means of knowledge, then the vender is not liable for any representation which he makes without fraud; but if, from the nature of the case, the vender has the exclusive means of knowledge, then he impliedly warrants that what he says is true. W. is also to be distinguished from mere matter of opinion or belief. When a servant or employé sells a horse, he has no right to give a W., unless his employer expressly authorized him to do so.

WARRAY, *v.* *wōr'rā* [from *war*]: in *OE.*, to make war upon. WARRAYD, or WARRAID, *pt.* in *OE.*, made war upon.

WARRE, *a.* *wawr* [*AS.* *warra*]: in *OE.*, worse.

WARREN, *n.* *wōr'rēn* [*OF.* *warennē*, a place where animals are kept—from *mid. L.* *warennā*, a warren or preserve—from *OHG.* *warjan*, to protect (see WARRANT)]: a piece of ground for the breeding and preservation of rabbits; a place frequented by rabbits; a place for keeping fish in a stream. WAR'RENER, *n.* *-ēr*, the keeper of a warren.

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WARREN, *wör'ren*: town in Worcester co., Mass.; on the Chicopee river, and on the Boston and Albany railroad; 73 m. w.-by-s. of Boston. It is a thriving and prosperous place; contains 6 churches, high school, hotel, large steam-pump works, several cotton and woolen factories, 1 weekly paper. Pop. (1880) 3,889; (1900) 4,417.

WAR'REN: city, cap. of Trumbull co., O.; on the Mahoning river, and on the Erie, the Pittsburgh and Western, and the Pittsburgh Youngstown and Ashtabula railroads; 14 m. n. w. of Youngstown, 50 m. s. e. of Cleveland; near extensive coal and iron mines; has 3 national banks (cap. \$350,000), 1 sav. bank (cap. \$50,000), and 2 daily and 3 weekly newspapers; does a large business in iron, agricultural, dairy and manufactured products. Principal industries are the manufacture of foundry and machine-shop products, cotton bagging, flax-oil, and carriages. Pop. (1880) 4,428; (1890) 5,973; (1900) 8,529.

WAR'REN: borough, cap. of Warren co., Penn.; on the Allegheny river, and on the Dunkirk Allegheny Valley and Pittsburgh, the Western New York and Pennsylvania, and the Pennsylvania railroads; 35 m. n. e. of Titusville, 66 m. e.-by-s. of Erie. It contains 8 churches, graded schools, public library, gas and electric light plants, co. court-house, 3 nat. banks, 1 state bank, and 3 daily and 4 weekly newspapers. It is the centre of the oil trade of this petroleum region, and manufactures lumber, oil, leather, boilers and engines, wooden-ware, and sash, doors and blinds. Pop. (1880) 2,810; (1890) 4,332; (1900) 8,043.

WAR'REN: town in Bristol co., R. I.; on Narragansett Bay, and on the Old Colony railroad; 10 m. s.s.e. of Providence. Has an excellent harbor, 6 churches, high school, acad., 3 nat. banks (cap. \$480,000), 1 sav. bank, and 1 weekly newspaper; manufactures cotton goods, braid and twine. Pop. (1880) 4,007; (1890) 4,489; (1900) 5,108.

WAR'REN, FITZ-HENRY: soldier: 1816, Jan. 11—1878, June 21; b. Brimfield, Mass. He settled in Burlington, Io., 1844, and engaged in newspaper work and in politics; was asst. postmaster-gen. 1849. He served through the civil war, first as col., commanding the 1st Io. cav. regt., then as brig.gen.: he was brevetted maj.gen. 1865. He was member of the Io. state senate 1866; U. S. minister to Guatemala 1867-8; democratic presidential elector 1872. He was employed in journalism in New York toward the end of his life.

WAR'REN, GOUVERNEUR KEMBLE: soldier: 1830, Jan. 8—1882, Aug. 8; b. Cold Spring, N. Y. He graduated at West Point 1850; then was assigned to the engineer corps, and served till 1854 in surveys of the Mississippi delta and other river surveys. He was chief topographical engineer on Gen. Harney's staff in the Sioux expedition 1855; then spent three years in Dakota and Nebraska, preparing maps of those territories showing routes of railroads between the Mississippi and the Pacific Ocean. Then until the opening of the civil war he was asst. prof. of mathematics at West Point. He became col. of a N. Y. regt. of vols. 1861,

Aug. 31; and about the same time reached the rank of capt. in the engineers. His regt., having been stationed at Fortress Monroe, took part in the action of Big Bethel. Joining the Army of the Potomac early in 1862, he served in the Peninsular campaign. 1862, May, he was appointed to command a brigade in the 5th corps, and participated in the taking of Hanover Court-house, the pursuit of Gen. J. E. B. Stuart, and the battles of Gaines's Mill and Malvern Hill. Having been ordered to reinforce Gen. Pope, he was in the battle of Manassas. Then he was transferred to the 5th corps, and was in the battle of Antietam and through the Rappahannock campaign. 1863, Feb., he became chief of topographical engineers of the Potomac Army. At Gettysburg he captured at the opportune moment Little Round Top, the key of the Federal position. Later, commanding the 2d corps, and subsequently the 5th corps, he took part in the battles of the Wilderness, North Anna, Bethesda Church, Cold Harbor, Petersburg. He was removed from command on charges preferred by Gen. Sheridan of lack of promptitude in executing orders, inefficient handling of his corps, and neglect to repair the consequences of these errors. A court of inquiry virtually acquitted W. of all the charges. His commission as maj.gen. of vols. was issued 1863, May; he resigned it 1865, May, and took up his duties as maj. of the engineers; he became lieut.col. 1879. He wrote and pub. (1866) *Account of the 5th Army Corps at the Battle of Five Forks*—a statement of his case as against Gen. Sheridan's charges.

WARREN, HENRY: English painter, president of the Institute of Painters in Water-colors: 1798, Sep. 24—1879, Dec. 18; b. London. In his youth he was placed in the studio of Nollekens the sculptor; there he was associated with Bonomi and Gibson. Through Benjamin West, W. obtained an introduction to the sculpture-room of the Brit. Museum, where he practiced both drawing and modelling, and where he used to meet Haydon's pupils, Bewick, Christmas, and the Landseers. In 1818 he became a student of the Royal Acad. W.'s first paintings were in oil. One, from Collins's *Ode to the Passions*, W. repeated in water-color, and sent it for exhibition to the 'New Society of Painters in Water-colors' 1835. Of this soc., now the 'Institute of Painters in Water-colors,' W. was pres. more than 30 years. He greatly contributed toward raising the English school of water-color drawing to its present unrivalled eminence. W.'s first great picture in water-colors was *The Happy Valley*, from *Rasselas*—embodying both landscape and figures, and showing great power in composition and coloring. Many of his subsequent pictures are on Eastern subjects; and many are scriptural, as—*Rebecca at the Well*, *Hagar and Ishmael cast out into the Wilderness*, *Christ and the Woman of Samaria*, *Joseph's Coat brought to Jacob*, *Christ with His Disciples in the Cornfield*, *The Death of the First-born*, *The Flight into Egypt*. Of Eastern subjects not scriptural are: *The Dying Camel in the Desert*, *A Halt in the Nubian Desert*, *Moslem Charity*, *The Crusaders' First Sight of Jerusalem*. Of subjects not Eastern are:

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Alfred in the Swineherd's Cottage, Incipient Courtship, Happy Nutting Days; besides numerous English landscapes. W. was prof. of the fine arts at Queen's College, London; and wrote, among other works, a little book on *Water-color Painting*, and one on *Artistic Anatomy*.—His son EDMUND GEORGE W. became well known as a water-color artist.

WARREN, HENRY WHITE, D.D.: Methodist Episc. bishop: b. Williamsburg, Mass., 1831, Jan. 4. He graduated at Wesleyan Univ. 1853; taught natural science till 1855, and then became minister of the Meth. Episc. Chh. He was pastor of churches in several towns of Mass. 1855–70, and in the mean time was member of the state legislature. He was pastor of Meth. churches in Philadelphia 1871–74 and 1877–80. At the gen. conference at Cincinnati, O., 1881, he was elected bp. As bp. he visited the conferences of e. Asia, attended the annual conference of Japan, and made the first episcopal visit to the Corean mission 1887. He has published many books and contributed articles to periodical publications. Among his works are: *Sights and Insights, or Knowledge by Travel* (1874); *Studies of the Stars* (1878); *Recreations in Astronomy*.

WARREN, JAMES: leader in the Amer. revolution: 1726, Sep. 28—1808, Nov. 27; b. Plymouth, Mass. Having graduated, 1745, at Harvard, he engaged in commerce in Plymouth; was member of the colonial assembly 1766–74, and was prominent in establishing the system of committees of correspondence between the several colonies. He succeeded Gen. Joseph Warren as pres. of the Mass. provincial congress, after Gen. Warren's death at Bunker Hill.—His wife, MERCY (OTIS) W. (q.v.), was one of the most highly educated women of her time in America.

WARREN, JOHN, M.D.: physician: 1753, July 27—1815, Apr. 4; b. Roxbury, Mass.; son of Dr. Joseph W. (q.v.). Having graduated at Harvard, he studied medicine and practiced in Salem, Mass. In the battle of Bunker Hill he attended the wounded, and himself received a bayonet-thrust; became hospital surgeon, and, 1776, accompanied the troops to New York and N. J.; was superintending surgeon 1776–82. He was the first prof. of anatomy and surgery in the Harvard Med. School. He contributed scientific *Memoirs* and *Communications* to the Amer. Acad. and the Mass. Med. Soc., and pub. *Mercurial Practice in Febrile Diseases*.

WARREN, JOHN COLLINS, M.D.: surgeon: 1778, Aug. 1—1856, May 4; son of Dr. John W. (q.v.). He graduated at Harvard 1797; studied med. in London and chemistry in Edinburgh, and attended in Paris the lectures of Vauquelin, Cuvier, and Desfontaines. Returning to Boston, he became ed. of the *Monthly Anthology* 1803, and was one of the founders of a reading-room soc., which later became the Boston Athenæum. He became adjunct prof. of anatomy and surgery in the Harvard Med. School 1806; assisted in founding a hospital for the poor in Boston 1811; became full prof. of anatomy and surgery in Harvard 1815; and was one of the founders of the Mass. Gen. Hospital. He

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performed with success many surgical operations previously unknown in America, and was the first to operate for strangulated hernia. He visited Europe 1837 for further professional study. He introduced the use of ether as a surgical anæsthetic 1846, and did much to procure the adoption of it by the medical profession. Besides contributing to medical and scientific journals, W. published a great many separate tractates and volumes; among them, *Description of an Egyptian Mummy; Sensorial and Nervous Systems in Man and Animals; Description of the Siamese Twins; Physical Education and Preservation of Health; Etherization; Chloroform; Fossil Impressions in the Sandstone Rocks of Connecticut River.* His *Life* has been written by his brother, Edward Warren.

WARREN, JOSEPH, M.D.: revolutionary soldier and physician: 1741, June 11—1775, June 17; b. Roxbury, Mass.; descended from Peter W., mariner, whose name occurs in the Boston town-records 1659. After graduation at Harvard 1759, he became master of the Roxbury grammar school; then, having studied medicine, began practice 1764. He contributed to the *Boston Gazette*, 1775, many articles on the obnoxious Stamp Act; and thus was formed between him and Samuel Adams (q.v.) a life-long friendship. W. gave offense to the gov. of the Mass. colony, Francis Bernard, by these contributions to the *Gazette*, and was prosecuted for seditious libel, but was acquitted. He participated in every town-meeting held in Boston from the arrival of the British troops 1768, Oct., to 1770, Mar., when they were recalled. His political activity won for him from a tory pamphleteer characterization as a 'crazy doctor,' 'one of our most bawling demagogues and voluminous writers.' When Samuel Adams went to attend the continental congress at Philadelphia 1774, Aug., the leadership of the popular party in Boston devolved on W. He was author of the 'Suffolk resolves'—a declaration of rights adopted 1774, Sep. 9, in a convention of representatives of Suffolk co. The 'resolves' declared that a king that violates the people's chartered rights has no just claim to allegiance; they were in tone and spirit revolutionary; but they were approved by the continental congress. In Oct., as chairman of the Mass. committee of safety, it was his duty to organize the militia. It was W. that sent Paul Revere (q.v.) and William Dawes out to warn the people on the roads toward Concord of the movements of the British forces; the next morning, hearing of the affair at Lexington, he hastened to the scene of action. He attached himself to the staff of Gen. Heath, commander of the militia, and was in the severe struggle with the British at Menotomy. He became pres. of the Mass. provincial congress May 31, and thus the chief executive under the provisional govt.; June 14 he was chosen maj.gen. of the Mass. forces. As pres. he attended a meeting of the provincial congress June 16, and passed the night in transacting the public business; the next morning he met the committee of safety on Cambridge common; about noon he rode over to Bunker Hill, having learned of the landing of the British force at Charlestown.

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Though Putnam and Prescott wished to recognize him as commander for that day, W. refused, saying he would first be instructed in the art military by them. While rallying the militia near Prescott's redoubt, W. was killed by a musket-ball. His widow died 1773, and W.'s children were left in comparative destitution, which was relieved by the generous act of Gen. Benedict Arnold, who personally contributed \$500 toward their support and education, and besides procured from congress a pension for them. See W.'s *Life and Times*, by Richard Frothingham (1865).

WAR'REN, MERCY (OTIS): author: 1728, Sep. 25—1814, Oct. 19; b. Barnstable, Mass.; wife of James W. (q.v.); sister of James Otis (q.v.). She was through life the intimate friend of Abigail Adams, wife of Pres. John Adams, and had the esteem and friendship of many of the most notable public men of her time in America. Her first essay in authorship was *The Group*, a satiric dramatic composition directed against the tories. She recounted in *The Squabble of the Sea Nymphs* the doings of the 'Boston tea-party.' She wrote two tragedies—*The Sack of Rome*; *The Ladies of Castile*. She pub. a *History of the Amer. Revolution* (1805, 3 vols.).

WAR'REN, SAMUEL: English lawyer and novelist: 1807, May 23—1877, July 29; b. Rære, Denbighshire. After passing with distinction through the Univ. of Edinburgh, he began the study of medicine; but abandoned it for law, and was entered as a student of the Inner Temple 1828, and called to the bar 1837. In 1851 he was made a queen's counsel, and was recorder of Hull 1854-74. W. represented Midhurst in parliament in the conservative interest 1856-59, when he was appointed one of the two masters of lunacy. His *Passages from the Diary of a Late Physician* was contributed to *Blackwood's Magazine* 1830-1, pub. in 2 vols. 1832—a later vol. 1838: it contains many touching and strikingly realistic stories, and was translated into several European languages. It had great popular success. W. excels in depicting with impressive interest the scenes of modern life: his work, though occasionally crude in pathos and extravagant in caricature, is always bold and powerful. In 1841 appeared *Ten Thousand a Year*, a still more successful work. His later books in the same general line were of less interest. His *Works, Critical and Imaginative*, were pub. in 4 vols. 1854. In addition to many works on more professional subjects, he edited *Blackstone's Commentaries Systematically Abridged*.

WAR'REN, WILLIAM: comedian: 1812, Nov. 17—1888, Sep. 12; b. Philadelphia, Penn.; son of William W. (Eng. actor), and cousin of Joseph Jefferson. He was educated at the Franklin Institute, Philadelphia, and made his first appearance at the Arch St. Theatre in that city, 1832. He afterward played in New York, Boston, and other cities, and 1845 at the Strand Theatre, London. In 1846 he opened the Howard Athenæum, Boston, and the next season joined the stock-company of the Boston Museum, retaining this connection 35 years—the remainder of his professional life.

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WAR'REN, **WILLIAM FAIRFIELD**, D.D., LL.D.: educator: b. Williamsburg, Mass., 1833, Mar. 13; bro. of Bp. William F. Warren. After graduation, 1853, at Wesleyan Univ., he became Meth. Episc. minister in the New England conference 1855; then made further study of theol. at Andover, Halle, and Berlin. He was delegate to the Evangelical Alliance Convention at Berlin 1857; prof. of systematic theol. in the Meth. Episc. Mission Theol. Institute in Bremen 1861-66; then held a similar professorship in Boston Theol. Seminary, which later was aggregated to Boston Univ. He was chosen pres. of that univ. 1873, and also prof. of the comparative history of religions, comparative theol. and philosophy of religion. His works include *Anfangsgründe der Logik* (Bremen 1864); *Einleitung in die systematische Theologie* (1865); *Paradise Found, the Cradle of the Human Race at the N. Pole*.

WARRENSBURG, *wör'rënz-bërg*: city, cap. of Johnson co., Mo.; on the Black river and on the Missouri Pacific railroad; 29 m. w. of Sedalia, 65 m. e.s.e. of Kansas City. It is the seat of the S. Missouri State Normal School, and is noted for its valuable sandstone quarries. It contains 15 churches, several flour and woolen mills, steam elevator, 4 state banks (cap. \$127,000), 1 private bank, and 1 daily and 3 weekly newspapers. It ships wheat and grain. Pop. (1880) 4,049; (1890) 4,706; (1900) 4,724.

WARRINGTON, *wör'rëng-ton*: parliamentary and municipal borough and manufacturing town of Lancashire, England; on the right bank of the Mersey; 20 m. e. of Liverpool by railway, 18 m. w.s.w. of Manchester, 182 m. n.w. of London. After the parish church, which is of Saxon origin, the chief buildings are the cotton and other factories and the cloth-halls. W. is an ancient town, and in the older streets old-fashioned wooden houses are still seen. The manufactures comprise cotton goods, as fustians, twills, corduroys; chemicals; files and other tools, pins, wire and wire-woven work; glass; leather and soap; and a famous ale is brewed. The best-known industry of W. is the preparing of heavy leather. Vessels of 100 tons can ascend the Mersey as far as the bridge which spans the river at this point.—Pop. of municipal borough (1871) 32,144; (1881) 41,452; (1891) 52,742; (1901) 64,241.

WARRINGTON, *wör'rëng-ton*, **LEWIS**: naval officer: 1782, Nov. 3—1851, Oct. 12; b. Williamsburg, Va. Having been educated at William and Mary College, he became midshipman 1800, and made his first cruise on the *Chesapeake* frigate in W. India waters, suppressing piracy. He joined the schooner *Vixen* of Preble's squadron 1803, and served with great credit in the war with Tripoli. He became acting lieut. 1805, and served on the station of Tripoli till 1807; was commissioned lieut. 1807, master-commandant 1813; and while commanding the *Peacock* captured a Brit. sloop. He was continually in sea-service till 1821, when he became commandant of the Norfolk navy-yard; he was commandant at Pensacola 1826. W. commanded the W. India squadron 1824-26, and thereafter did service ashore in various capacities.

WARRIOR: see under WAR.

WAR'SAW: a province in Russian Poland; bounded n. by the Polish govts. Plock and Lomza, e. by Siedlce, s. by Radom, Piotrkow, and Kalisz; 5,623 sq. m. It is a narrow strip of land occupying part of the great central plain of Poland, and is generally low and flat, and not very fertile. It is traversed by the Vistula from s.e. to n.w., and portions of it are frequently devastated by inundations. The people chiefly are Poles, Mazurs, Jews, and Germans, there being but few Russians.—Pop. (1890) 1,429,497; (1897) 1,933,689.

WAR'SAW: town of Russian Poland, former cap. of Poland (q.v.); now cap. of govt. of W.; on the left bank of the Vistula; about 395 m. e. of Berlin by railway, 700 m. s.w. of St. Petersburg; lat. $52^{\circ} 13'$ n., long. $21^{\circ} 2'$ e. It stands partly on a plain, partly on rising ground sloping upward from the river, extends over a wide area, and consists of the city proper and of a number of suburbs, several of which are beautifully built. A bridge of boats 1,626 ft. long, which formerly connected W. with the suburb of Praga on the right bank of the Vistula, was superseded by an iron bridge 1876. The streets mostly are narrow, though several are broad and handsome. The Vistula at W. is broad, shallow, and ever-changing in its sandy course; and is navigable for large vessels only after thaw has set in, when rivers of melted snow pour down into it from the Carpathians, or when it is swelled by the autumn rains. But the only craft seen are rude rafts, usually laden with wheat, which they convey to Danzig by river; though within the last few years steamers have occasionally been employed. Seen from Praga, on the right bank, the castle, on a steep ascent, has a most imposing effect. Attached to the Saxon palace are a spacious court and gardens, considered the finest promenade in the city. Among the buildings are nearly 30 palaces; the Cathedral of St. John (dating from 1250), a Gothic building of great beauty, containing statues and many interesting monuments, among which is one by Thorwaldsen; the Lutheran church, loftiest building in W.; and numerous other places of worship, including synagogues. There are several large and memorable squares, as the Sigismund Square, containing the monument erected by Ladislas IV. in honor of his father, Sigismund III. In this square, 1861, Apr. 8, 40 unarmed and unresisting Poles were massacred. The citadel, erected by Emperor Nicholas for the express purpose of intimidating, and, if necessary, destroying the city, commands from its situation, every part of Warsaw. The univ., broken up by Emperor Nicholas after the insurrection of 1830, was re-established by decree 1864, through the influence of the Grand Duke Constantine; and besides this institution there are several minor colleges, gymnasia, etc. Woolen and linen fabrics, chemicals, sugar, and leather are manufactured. Pop. (1897) 638,209, about one-fourth of whom are Jews. The garrison numbers 20,000 men. For the history of W., see POLAND; JOHN III.; ETC.

WARSAW—WARTBURG.

WARSAW, *waror'saw*: common name for the fish Black Grouper (*Epinephelus nigritus*) of the s. Atlantic coast and the Gulf of Mexico; called also Jew-fish; much esteemed as food, and weighing 3-15 lbs.; not abundant, and taken with hook from hiding-places in salt-water rivers, where it winters.—The same common names are given also to the catalogued *Promicrops guasa*, attaining 300 lbs. weight (in Cuba twice that), a colored cast of one being in the National Museum.

WARSCH, a. *wârsh*: see **WERSH**.

WART, n. *wawort* [Icel. *varta*; Dan. *vorte*; Ger. *warze*, a wart]: a dry excrescence of different forms, found on the skin of animals, as on the human hand; a hardened protuberance on the surface of trees. **WART'ED**, a. full of warts; having warts, in *bot.*, having little knobs on the surface. **WART'Y**, a. -*î*, covered with warts; grown over with warts. **WART'LESS**, a. -*lês*, having no warts. **WART-CRESS**, a Brit. plant, the *Coronöpus Ruellii*, ord. *Crucifëræ*.

WARTBURG, CASTLE OF: see **EISENACH**.

WARTBURG, WAR OF THE (*Krieg von Wartburg*): legendary poetic contest, represented to have taken place about 1206 or 1207, on the Wartburg (see **EISENACH**): also a strange, obscure, and unharmonious poem in two parts, composed in the Middle High German dialect about 1300, on the basis of a historico-mythical tradition of the contest between the assembled poets. In the first part, executed in a long and artistically managed measure, and entitled *Tone des Fürsten von Thuringia*, Heinrich von Ofterdingen challenges the other poets to a contest in verse—the fate of the vanquished to be death—and asserts the excellence of Leopold, Duke of Austria, over all the other princes. Victory, however, inclining to the Eisenachers, Heinrich calls in Klingsor, the Transylvanian magician and astrologer, to his aid, who, on his part, fights his verse-battle against Wolfram von Eschenbach, by the assistance of evil spirits, with riddles and dark science. With distinct reference to Klingsor's 'black art,' the simpler and shorter measure of this second part is called *Schwarze Ton*. Throughout the whole poem, which may be regarded as the first attempt at a secular drama, but which is rather an intermediate link between the Lyric contest and the Drama, one may trace an unmistakable imitation of Wolfram's style of poetry. The author is unknown. From the inequality of the style, it may be inferred that several hands were employed in its composition. The poem, which has been much overrated in modern times, seems to have had little influence on literature. In a prose form the story of the Wartburg contest appears first—in the Thuringian Chronicles—after the beginning of the 14th c., and probably owes its origin to the poem: see **MINNESINGERS**. The poem was printed in a separate edition by Ettmüller (Ilmenau 1830), and is also in Bodmer's and Von der Hagen's collection of the *Minnesinger*.—See Von Plotz, *Ueber den Sängerkrieg auf Wartburg* (Weimar 1851).

WARTHÉ—WART-HOG.

WARTHÉ, or WARTE, *vâr'tâ* (Polish *Warta*, *vâr'tâ*): longest and most extensively navigable affluent of the Oder; rising on the s.w. frontier of Poland, 35 m. n.w. of Cracow. In Poland it flows n. and w. for 300 m. It then flows w.n.w. through Prussia 180 m., passes Posen, and joins the Oder at Kustrin, where it is 620 ft. broad. Total length 483 m.; navigable 220 m.

WART-HOG: a hog of the genus *Phacochoerus* and family *Suidæ*, closely resembling the true hog, particularly in the feet, but remarkably differing from it in dentition; the molar teeth being much like those of the elephant, replacing one another in the same manner. There are two triangular incisors in the upper jaw, and six small ones in the under; the tusks are lateral, very large, project far from the mouth, and are bent upward; there are six or eight molars in each jaw. The head is very large, and the muzzle very broad; the cheeks furnished with large wart-like excrescences, so that the appearance is altogether very remarkable and uncouth. It is a native of Africa. Wart-hogs feed very much on the roots of plants, which they dig up by their enormous tusks. The AFRICAN W., or HARUJA (*P. Æliani*), native of Abyssinia and of central Africa, from the coast of Guinea to that of Mozambique, is nearly 4 ft. long, has a naked slender tail of 12 in., is scantily covered with long bristles of light-brown color, and has a mane sometimes 10 in. long from between the ears along the neck and back. Another species is found in s. Africa (*P. Æthiopicus* or *Pallasii*), the *Valke Vark* of the Dutch colonists, at the Cape of Good Hope. The incisors of the latter fall out at an early age; those of the former are persistent.—A genus closely allied to *Phacochoerus* is *Potamochoerus*, of which there are several species, as the *Bosch Vark* of Cape Colony (*P. Africanus*), nearly black, with whitish cheeks having a central black spot; and the PAINTED PIG of w. Africa (*P. penicillatus*), reddish, with black face, forehead, and ears. The species of *Potamochoerus* frequent swampy grounds, and sometimes receive the name WATER-HOG. They have longer ears than the true wart-hogs, tapering and ending in a pencil of hairs; the face is elongated, and has a huge protuberance on each side. The flesh of all the wart-hogs and water-hogs is in high esteem. They are hunted by dogs, which are often killed in the encounter with them. They are much addicted to fighting among themselves.

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WARTON, *wawr'ton*, JOSEPH, D.D.: English poet and critic: 1722–1800, Feb. 23; b. Dunsfold, Surrey; son of Thomas W., vicar of Basingstoke, in Hampshire, prof. of poetry at Oxford, from whom he received his earlier education. At the age of 14 he was sent to the great school at Winchester, whence, 1740, he was transferred to Oriel College, Oxford, where four years afterward he took his degree B.A. After several years as a curate, he was presented (1748) to the rectory of Winsdale, near Basingstoke. He had become known as a writer of verse in the *Gentleman's Magazine*, Dodsley's *Museum*, etc., and as author of a volume of *Odes and other Poems*. In 1751 he went abroad with the Duke of Bolton; and after his return he issued, 1753, an ed. of Virgil, with a translation of the *Eclogues* and *Georgics*: this, with its critical notes and dissertations, found great approval, and subsequently procured him the degree M.A. from Oxford. In 1756 appeared vol. I. of his chief literary performance, *Essay on the Writings and Genius of Pope*; vol. II. 1782. Venturing, as he did, to question the positive supremacy which it was then fashionable to attribute to Pope, W. did not by this work attain any immediate increase of popularity: but the value in relation to the literature of the time of the critical principles announced in it, as also in his more casual essays, has since been recognized. In 1755 W. was appointed second master of Winchester School, of which he became head 1766. He was made a prebendary of St. Paul's 1782, and the living of Thorley, in Hertfordshire, was conferred on him. He obtained besides (1788) a prebend in Winchester Cathedral, and the rectory of Easton, which he soon exchanged for that of Upham. He resigned the mastership of Winchester 1793, and applied himself to preparing an annotated ed. of Pope (9 vols. 8vo 1797). At his death he was engaged on a similar edition of Dryden, of which he had published two vols.—Though W.'s reputation has not survived as a poet, yet it certainly has as a critic, with that of his distinguished brother.—See *Biographical Memoirs of Rev. Joseph Warton, D.D.*, by Rev. John Wooll, A.M. (1806).

WARTON, THOMAS: English poet and critic: 1728–1790, May 21; b. Basingstoke, in Hampshire, where his father, Thomas W., was vicar. W., like his elder brother Joseph, received his earlier education chiefly at home from his father. In 1743 he was entered at Trinity College, Oxford, where, 1750, he took his degree M.A. The next year he obtained a fellowship. He remained at the univ., employed as a tutor. He was made prof. of poetry 1757, and was esteemed as a lecturer. In 1767 he took his degree as bachelor of divinity, and was soon presented to the living of Kiddington by the Earl of Lichfield. In 1782 that of Hill Farrance, in Somersetshire, fell to him by favor of his college. Very early he became known as a poet; and 1754 published *Observations on the Fairie Queene of Spenser*, which established his reputation as one of the first critics of the day (2d ed. 2 vols. 1762). Of W.'s miscellaneous literary activity, no account need be given in detail. The work by which chiefly he is remembered is

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his *History of English Poetry* (vol. I. 1774; II. 1778; III. 1781; unfinished at his death). In its wealth of curious and interesting lore regarding the earlier portion of Eng. literature, the book remains unrivalled. W., 1777, published a collection of such of his scattered pieces as he deemed most worthy of being reprinted, and it found good acceptance. For the last six years of his life W. was poet-laureate. His last work was an elaborately annotated ed. of the *Minor Poems of Milton* (1785, carefully prepared reimpression 1791). In 1802 a new ed. of his poems was published, with a *Life of the author* by Mant.

WARTS (L. VERRUCÆ): lengthened Papillæ of the Skin (q.v.), closely adherent and ensheathed by a thick covering of hard dry cuticle. From friction and exposure to the air, their surface presents a horny texture, and is rounded off into a small button-like shape. Warts occur usually on the hands and fingers (rarely on the face or other parts of the body) of persons of all ages, but especially of children. Among varieties of warts are: (1) a long pendulous variety, *Verruca digitata*, said to occur nowhere but on the scalp of women of adult age, and sometimes to occasion great annoyance in brushing and combing the hair. (2) *Subungual Warts*, generally of syphilitic origin, growing, as their name implies, beneath or at the side of the finger or toe nails: they originate beneath the nail, and as they increase they crop out either at the free extremity or the side of the nail, and are often very painful. (3) *Venereal Warts*, caused by the direct irritation of the discharges of gonorrhœa or syphilis, and occurring about the parts liable to be polluted with such discharges: they are more fleshy and vascular than other warts.

Nothing is known of the causes of warts except that the third variety is induced by an irritating discharge, that the malignant form of wart which is the beginning of chimney-sweepers' cancer is caused by the irritation of soot, and that persons engaged in dissection and *post-mortem* researches are especially liable to them; hence it may be inferred that they are always due to some local irritation. Venereal warts are certainly contagious; with regard to others no positive statement can be made. In some cases, blood from a wart is capable of producing similar warts when applied to the skin. In consequence of the capricious way in which warts often spontaneously disappear, there are numerous popular charms for their removal. Common warts are so apt to disappear that they may often be left to themselves. Glacial acetic acid is perhaps the best remedy: it must be applied with a camel-hair pencil till the wart is well sodden, care being taken not to blister the neighboring skin: one or at most two applications will be sufficient. Nitrate of silver and tincture of iron are popular and general applications. Small warts hanging by a neck may often be very simply removed by the moderately tight application of an elastic ligament (for example, a small broken elastic ring) to the base. The wart usually shrivels up, and falls off within a week. The other varieties of warts must be left to the surgeon.

WARWICK.

WARWICK, *wawr'wîk*: township in Kent co., R. I.; on Narragansett Bay, 10 m. s.w. of Providence, and intersected by the Stonington and Providence railroad. W. contains the villages of Natick, Phoenix, Centreville, Arctic, Crampton, and Apponaug: in these villages are numerous cotton mills; also woolen-mills, bleacheries, print-works. There are 15 churches. Drum Rock, a balanced rock of great size, near the village of Apponaug, can be moved by a child, and makes a sound which can be heard for miles. Pop. (1880) 12,164; (1890) 17,761; (1900) 21,316.

WARWICK, *wôr'îk*: a municipal and parliamentary borough of England, chief town of the county of W.; on the Avon; 20 m. s.e. of Birmingham, 18 m. n.e. of Stratford-on-Avon, 108 m. n.w. of London. It is a very ancient town, and contains many interesting old buildings and institutions. Most notable is Warwick Castle, principal residence of the Earls of Warwick, beautifully situated on a rocky elevation, 40 ft. high, on the banks of the Avon. Guy's Tower, a part of the castle, is 128 ft. high, and was built 1394; and Cæsar's Tower, still more ancient, is 147 ft. high. The interior, before the castle was partly burned, 1871, Dec. 3, was remarkable for splendor and elegance, and has been restored in similar style. The Earl of Leicester's Hospital for aged brethren has an annual income of more than £2,000. There are many other charities, with schools, libraries, etc. Agriculture and general trade employ a large number of persons.—Pop. (1871) 10,986; (1881) 11,802; (1891) 11,905; (1901) 12,000.

WARWICK, *wôr'îk*, Sir GUY; or GUY OF WARWICK: legendary hero of one of the most ancient and popular English romances: said to have lived in the 10th c. in Saxon times and in the reign of Athelstane; son of Segard, steward of Rohand, Earl of Warwick. He sought the hand of the earl's daughter Felice; and gaining her promise of it on condition of his earning it by knightly deeds, he crossed to Normandy, and at the great tournament of Rouen distanced all competitors, and at once set out into 'far lands,' travelling through Spain, Almayne, and Lombardy, and gaining the prize in every tournament. Returning, and finding Felice still unsatisfied, he traversed Flanders and Italy; then went to Constantinople to save Emperor Ernis from the Saracens, slew the mighty Coldran, cousin of the 'soudan,' and scattered his huge army. The grateful emperor pressed on him the hand of his lovely daughter Loret; but Sir Guy, tearing himself away, returned to his native country. A most portentous dragon was then ravaging Northumberland; and he hastened to meet the monster, slew him, and carried his head to King Athelstane, at Lincoln. The fair Felice had now no scruple to marry the hero. But regret for all the slaughter he had done merely for a woman's love overcame him, and after 40 days of wedded happiness he left his home in the garb of a palmer to visit the Holy Land, where he slew the ferocious giant Amiraunt; then returned to England; and finding Athelstane besieged in Winchester by the Danish Anlaf, of whose army the mainstay was the terrible Col-

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brand, Sir Guy, still in his disguise, after an awful struggle, struck off the champion's head. He now visited his wife—being unknown in his palmer's weeds—and then retired to a hermitage in Ardenne. Before his death he sent Felice her parting ring as a token; and she arrived in time to close his eyes, survived him only 15 days, and was buried in the same grave.

WARWICK, RICHARD NEVIL, Earl of, K.G.: English feudal baron, popularly named the 'king-maker': about 1420–1471, Apr. 14; eldest son of Richard, Earl of Salisbury, and Alice, daughter and heiress of Thomas Montacute. Lord R. Nevil, as he was then styled, early showed distinguished bravery and brilliant personal qualities in a hostile incursion across the Scottish marches, in which he accompanied his father, the Earl of Salisbury. He became the most powerful nobleman in the kingdom, by his marriage with Anne, daughter and heiress of Richard de Beauchamp, Earl of W. He not only acquired by this alliance the broad lands of the W. family, but was created Earl of W., with succession to the heirs of his wife. He is the most prominent figure in the civil War of the Roses (q.v.), one of the darkest periods of English history. He was connected with both the Lancastrian and the Yorkist houses; and was first cousin of Edward IV. and second cousin of Henry VI. The Duke of York gained his support by his (the duke's) marriage with Lady Cecille Nevil, who was W.'s aunt; and when the barons declared the incapacity of Henry VI., and chose the duke to be protector of the kingdom, W. led into the field his well-tryed borderers of Wales. The Yorkists and the Lancastrians met first at St. Albans 1455, when W., rushing suddenly into the town at the head of his men, won the battle by his impetuous onset. He was rewarded with the government of Calais—'then,' says Comines, 'considered as the most advantageous appointment at the disposal of any Christian prince, and that which placed the most considerable force at the disposal of the governor.' He also obtained command of the fleet for five years. In 1458 he sailed from Calais with five large and seven small vessels, and attacked a fleet of 28 ships, belonging to the free town of Lübeck. After a battle of six hours, he took six of the enemy's vessels. In 1460 he landed in Kent at the head of his troops, and entered London amid the acclamations of the people. He defeated the queen's army, near Northampton, with great slaughter, and obtained possession of the person of the king. Richard, Duke of York (q.v.), now advanced his claim to the throne. Queen Margaret raised an army to rescue the king; and the duke, committing the idiotic monarch to the custody of the Duke of Norfolk and W., advanced to Wakefield to attack the Lancastrians. The duke was taken and put to death; and W.'s father, the Earl of Salisbury, with 12 other Yorkist chiefs, was beheaded at Pontefract. Another battle at St. Albans was won by the Lancastrians; but Edward, Earl of March, now Duke of York, accompanied by W., marched boldly on London, which adhered to the Yorkist cause;

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and Edward was proclaimed king as Edward IV. The next battle was that of Towton, near York. The Lancastrians had retaken the pass of Ferrybridge, on the river Aire, and W., in despair at the loss of so good a position, rode up to Edward, and, dismounting, shot his own horse through the head, as a signal for an attack from which there could be no retreat, exclaiming: 'Sir! let him flee who will flee, but by this cross' (kissing the hilt of his sword) 'I will stand by him who will stand by me!' The Lancastrians were defeated with immense loss; and Edward, returning to London in triumph, was crowned 1461, June 22. The battle of Hexham was followed by the capture of Henry; and W., who had been left in command in London, placed the deposed king on a horse, under whose belly his feet were fastened, and thus led him through Cheapside to the Tower. W., having been authorized to negotiate with Louis XI. of France for the marriage of his sister-in-law, the Princess Bonne of Savoy, to King Edward, could not brook the king's sudden marriage with Elizabeth Woodville, and seemed inclined to show that he could pull down as well as set up kings. He was now at the height of his power. To the earldoms of Warwick and Salisbury, with the estates of the Spencers, he added the offices of high admiral and great chamberlain, with the lord-lieutenancy of Ireland and the government of Calais. His power had grown too great for the safety of the throne. Comines states the income of his offices at 80,000 crowns a year, besides the immense revenues accruing from his patrimony. After being sent into honorable banishment by means of embassies to France, Burgundy, and Brittany, he gave his daughter in marriage to George, Duke of Clarence, against Edward's wish. He soon afterward broke out into revolt against Edward, and concluded a treaty with Queen Margaret, by which it was agreed that her son, Prince Edward, should espouse Anne Nevil, W.'s daughter, and that, in failure of issue, the crown should devolve on Clarence. King Edward escaped to Holland; and Henry VI. resumed the sovereignty. This sudden turn of fortune soon met a check in another revolution. Edward raised a body of Flemings and Dutchmen, and, landing near Hull, advanced toward London. He gave battle to King Henry's army, commanded by W., at Barnet, 1471, Apr. 14. The battle was memorable and important. W. and his brother, Montague, were left dead on the field, and with them fell the greatness of the House of Nevil. This fatal battle, followed by the decisive engagement of Tewkesbury, completed the defeat of the Lancastrians, and concluded the sanguinary War of the Roses. It appears (Fenn's *Letters*) that every individual (male?) of two generations of the great families of W. and Somerset fell either on the field or on the scaffold, a victim of these sanguinary contests. W. is the most conspicuous personage of these disturbed times. He kept open house wherever he resided, and daily fed 30,000 persons at his various mansions. He loved turbulence for its own sake, and was ready to make or unmake any king, according to the caprice of the moment.

WARWICK—WAS.

WAR'WICK (ROBERT RICH), Earl of: English nobleman: 1590–1658; descendant of Lord Chancellor Rich. He sympathized with the Puritans of his time, and in the great rebellion served on the Puritan side as lieut. of the fleet under Northumberland. He was deeply interested in the colonization of R. I., and befriended the Rev. Thomas Hooker, founder of Wethersfield, Conn.

WARWICKITE, n. *waw'r'wĭk-ĭt* [from *Warwick*, Orange co., N. Y., where found]: mineral occurring in slender rhombic prisms in granular limestone near Edenville, N. Y. Hardness, 3·4; sp. gr., 3·19 to 3·43; lustre, somewhat metallic to vitreous; color, dark-brown, with sometimes a copper-red tint; streak, bluish black; brittle; composition, a borotitanate of magnesia and iron.

WARWICKSHIRE, *wŏr'ĭk-shĕr*: a midland county of England; bounded w. by Worcestershire, n. by Stafford and Leicester shires, and s. mainly by Oxford; greatest length 50 m., greatest breadth 33 m.; about 885 sq. m. (566,458 acres). The surface is marked by gentle eminences and vales. The n. districts were formerly occupied by the forest of Arden, of which there are still remains; and the scenery, in general remarkably rich and charming, is varied by moor and heath. The principal rivers are the Avon, flowing from n.e. to s.w.; and the Tame in the n. The soil varies much in quality, being cold and heavy on the higher and more exposed positions; while in more favorable districts it is good. Of the whole area, there were (1881) 491,569 acres under all kinds of crops. The chief manufacturing centres are Birmingham and Coventry (q.v.): the brass jewelry, iron, and steel-pen trades are carried on in the former; ribbon-weaving and watch-making in the latter. Of minerals, coal, stone, lime, and marl are found. The county returns four members to the house of commons, besides the 4 from the boroughs of Birmingham, Aston Manor, Coventry, and Warwick and Leamington. Pop. (1871) 634,189; (1901) 347,691.

WARY, a. *wā'rĭ* [Icel. *vara*, to warn: Ger. *gewahr*, aware: Sw. and Dan. *var*; Icel. *varr*, wary: F. *gare*, look out! take care! OE. *gaure*, to gaze: Fin. *wara*, foresight]: carefully watching and guarding against artifices and dangers; carefully cautious; discreet; prudent. **WA'RILY**, ad. *-lĭ*, with prudence; cautiously. **WARIMENT**, n. *wā'rĭ-mĕnt*, in OE., a warding off; care; caution. **WA'RINESS**, n. *-nĕs*, the state or quality of being wary; cautiousness; prudent forethought.—**SYN.** of 'wary': cautious; circumspect; careful; prudent; discreet; watchful.

WAS, v. *wŏz* [Goth. *visan*, to remain, to be: Icel. *vera*; Sw. *vara*; AS. *wesan*, to remain, to be: Skr. *vas*, to dwell, to live]: the past tense of the verb *be*.

WASH.

WASH, *v. wōsh* [imitative of the sound of dashing water: AS. *wascan*; Ger. *waschen*; Sw. *waska*, to wash; Norw. *vassa*, to dabble, to splash: Gael. *uisge*, water: to cleanse with water; to perform the business of cleansing clothes; to overflow or dash against; to sweep off, as from the deck of a vessel; to perform the act of ablution; to free from ceremonial defilement; to wet, as by falling rain; to coat or ornament by overlaying with a substance in a moist state; to cover with a thin coating or deposit of metal; to purify; to resist injury from washing, as colors that will *wash*; hence, in *slang*, to endure trial or examination, as, the story won't *wash*: N. a substance in a moist state laid or spread over a surface to beautify or preserve it; a cosmetic; a lotion; a color laid over a pencil or crayon drawing to give it a more finished and natural appearance; the sweep or rush of water; any waste liquid, as that of a kitchen, used in feeding hogs; fermented wort; the shallow part of an arm of a sea, or of a river; a marsh; a bog; a quagmire; the whole quantity of clothes washed at once; the act of washing them; a liquid weak and poor; matter collected by water. WASH'ING, *imp.*: N. the act of cleansing with water; ablution; the clothes washed at one time. WASHED, *pp.* *wōsh't*. WASH'ER, *n.* -*ér*, one who or that which washes; a flat metal ring placed between the nave of a wheel and the linchpin; a circular piece of leather, rubber, metal, or other material, placed at the base of a screw or nut to prevent injury to the surface, or to render the junction tight. WASH'ABLE, *a.* -*ā-bl*, that can stand washing. WASH'Y, *a.* -*ī*, damp; soft; weak; thin; watery; poor or valueless. WASH'INESS, *n.* -*nēs*, the state or quality of being washy, watery, or weak. WASH-BALL, a composition of soap and other substances for washing. WASHBOARD, a board on the gunnel of a boat to prevent the sea breaking over; a corrugated board on which clothes are rubbed when washed by hand. WASH-HOUSE, an out-building for washing clothes. WASH-LEATHER, a soft kind of leather, usually of split sheepskin, dressed to imitate chamois leather. WASH-POT, a vessel in which anything is washed. WASH-TUB, a tub for washing clothes. WASHSTAND, or WASHHAND-STAND, a small table with a basin and conveniences for washing the hands and face. WASHERMAN, a man who washes. WASHERWOMAN, a woman who washes clothes.

WASH, *wōsh*: wide estuary on the east coast of England, between the counties of Lincoln and Norfolk; about 22 m. in length, and 15 m. in average breadth. It is bordered by low and marshy shores, and receives the rivers Witham, Welland, Ouse, Nen, and Nar. The estuary for the most part is occupied by sand-banks, dry at low water; and between these sand-banks are the channels through which the rivers mentioned flow into the North Sea. On both sides of the channel by which the Ouse falls into the sea, considerable tracts of land have been reclaimed. Anchorage is afforded to vessels by two wide spaces or pools of water, called respectively Lynn Deep, opposite the coast of Norfolk, and Boston Deep, opposite the Lincolnshire coast.

WASHBURN.

WASHBURN, wòsh'bèrn, CADWALLADER COLDEN: lawyer: 1818, Apr. 22—1882, May 14; b. Livermore, Me.; bro. of Israel W. (1813-83) (q.v.). Having worked on his father's farm and been employed in a country retail store, attending school in winter, he was schoolmaster for one term, then emigrated to the w., studied law, and began practice in Mineral Point, Wis., 1842; but 2 years later became agent for settlers desiring to enter on the public lands. In partnership with Cyrus Woodman, he established a bank at Mineral Point 1852. W. was representative in congress 1855, Dec.—1861, Mar., and then refused renomination. He became col. of a Wis. cavalry regt 1861, Oct. His first milit. service was in Ark., under Gen. Samuel R. Curtis. In the battle of Grand Coteau he saved the 4th division of Curtis's army from annihilation by the enemy. He became brig.gen. 1862, July, and maj.gen. Nov.; participated in the siege of Vicksburg; then was put in command of the 13th army corps and transferred to the Gulf dept. Landing at the entrance of Matagorda Bay, Tex., with 2,800 men, 1863, Nov. 29, he reduced Ft. Esperanza, a work made bomb-proof with railroad iron, surrounded by a deep moat filled with water, having a garrison of 1,000 men, and mounting 10 guns. He was appointed commandant at Memphis 1864, Apr. He was again representative in congress 1865, May—1871, Mar.; gov. of Wis. 1872-74. He then retired from political life and gave attention to the development of his property. As owner of great tracts of timber-lands he became a great manufacturer of lumber. At Minneapolis he established the first flouring-mill for applying the 'patent process.' He founded at the cost of \$50,000 an astronomical observatory at the state univ. of Wis. He bequeathed to the city of La Crosse \$50,000 for a public library, and to Minneapolis \$375,000 for an orphans' home.

WASH'BURN, CHARLES AMES: editor: b. Livermore Me., 1822, Mar. 16; bro. of Israel W. (1813-83) (q.v.). He graduated at Bowdoin 1848, and soon afterward practiced law in Mineral Point, Wis. He removed to Cal. 1850, where he was employed as journalist, and 1853 founded the *Alta California* newspaper in San Francisco; 1858-60 he was editor and part owner of the San Francisco *Daily Times*; was presidential elector-at-large 1861, U. S. commissioner to Paraguay 1861-63, then minister resident 1863-68. During his term of residence there, Paraguay was ruled by Francisco Lopez (see PARAGUAY), and W., having been accused of conspiring against the life of the dictator, was compelled to flee the country. After his return to the United States W. became a resident of N. J., and applied himself to mechanical invention and literature. He is inventor of a form of type-writing machine, the 'typograph.' He pub. two novels—*Philip Thaxter* (1861) and *Gomery of Montgomery* (1865); a *History of Paraguay* (1870); *Political Evolution* (1887); *From Poverty to Competence* (1887). He d. 1889, Jan. 26.

WASHBURN.

WASHBURN, EDWARD ABIEL, D.D.: clergyman: 1819, Apr. 16—1881, Feb. 2; b. Boston, Mass. Having graduated at Harvard 1838, he studied theol. at Andover Seminary and in New Haven; and 1842 was licensed as a Congl. preacher. He entered the ministry of the Prot. Episc. Chh., 1844, July 12, when he was ordained deacon; he received priest's orders 1845. He was rector of a chh. in Newburyport, Mass., 1844-51; travelled in Egypt and the East 1851-53; was rector of a chh. in Hartford, Conn., 1853-62, in the mean time lecturing on chh. polity in Berkeley Divinity School, Middletown, Conn.; rector of a church in Philadelphia 1862-65, and of Calvary Church in New York, 1866-81. Dr. W. was a member of the Amer. New Test. Revision Company. He was a leader among low-churchmen, and held distinguished rank for catholicity of spirit, Christian fervor, and intellectual force. He pub. *Relation of the Episc. Chh. to the Other Christian Bodies* (1874); *Social Law of God* (sermons); *Voices from a Busy Life* (poems).

WASHBURN, ELIHU BENJAMIN: see WASHBURN, ELIHU BENJAMIN.

WASHBURN, EMORY, LL.D.: lawyer: 1800, Feb. 14—1877, Mar. 18; b. Leicester, Mass.; descendant of John W., first sec. of the Mass. Bay Co., and so a kinsman of most of the other Washburns of the United States. He graduated at Williams College 1817; was admitted to the bar 1821; settled in Worcester 1828, and there for 30 years stood at the head of the legal profession. He was member of the Mass. house of representatives 1826-7, and of the Mass. senate 1841-2; judge of the common pleas court 1844-48. He was elected gov. 1853, re-elected 1854; became Bussey prof. of law in Harvard 1856; resigning the professorship 1876, he resumed practice in Cambridge, and represented that town in the state legislature. He published numerous genealogical and historical memoirs and works on the law; among them, *Judicial Hist. of Mass.*, 1630-75 (1840); *Hist. of Leicester* (1860); *Amer. Law of Easements and Servitudes* (1863); *Testimony of Experts* (1866); *Study and Practice of Law* (1871).

WASHBURN, GEORGE, D.D.: missionary and educator: b. Middleboro, Mass., 1833, Mar. 1. After graduation at Amherst College 1855, he studied theol. at Andover Seminary, and 1858 went to Turkey as missionary of the Amer. Board of Foreign Missions: he was released from service to the board 1868; but still continued his missionary labors. He was prof. of philosophy and polit. econ. in Robert Coll., Constantinople, 1869-76, and then became pres. of that college. After the war between Russia and Turkey, the first parliament of Bulgaria passed a vote of thanks to W. for his efforts in behalf of Bulgarian freedom; and 1884 the govt. of Bulgaria conferred on him the cross of commander of the order of St. Alexander. Dr. W. is known as a clear, instructive, and vigorous writer. He has contributed articles to several Eng. and Amer. periodicals, and has pub. *Woman's Work in the Church*.

WASHBURN.

WASH'BURN, ISRAEL, LL.D.: governor of Me.: 1813, June 6—1883, May 12; b. Livermore, Me.; grandson of Israel W., revolutionary soldier, descendant of John W., sec. of Plymouth colony, who came from England to Duxbury, Mass., 1631. He was admitted to the practice of law 1834, and settled in Orono, Me.; was member of the Me. legislature 1842-3; representative in congress 1851, Dec.—1861, Jan.; then was gov. of Me. for one term; collector of customs at Portland 1863-77. W. was elected pres. of Tufts Coll. 1875, but declined the office. He pub. (1874) *Notes Historical, Descriptive, and Personal, of Livermore*.—His father, ISRAEL W., settled in Me. 1806, and engaged in ship-building on the Kennebec 1808; he established a trading-post at Livermore, Me., 1809.—The father of this Israel W., whose name also was ISRAEL W., served in the revolutionary war and reached the rank of capt. He was a citizen of Mass., was repeatedly elected to the Mass. legislature, and was member of the Mass. convention that ratified the U. S. constitution.

WASH'BURN, WILLIAM BARRETT, LL.D.: United States senator: 1820, Jan. 21—1887, Oct. 5; b. Winchendon, Mass. After graduation at Yale, 1844, he engaged in manufacturing in Greenfield, Mass., and there also was pres. of a bank. He represented the town in both branches of the legislature 1850-54; was representative in congress 1862-72; was gov. of Mass. 1872,3,4; but 1874, Mar. 3, resigned the governorship to take the seat in the U. S. senate vacated by the death of Charles Sumner. He retired from public life 1875. He bequeathed to the Home Missionary Soc., the Amer. Missionary Association, and the Amer. Board of Commissioners for Foreign Missions, about \$50,000 each. His benefactions to the public library of Greenfield were large.

WASHBURNE—WASHING.

WASH'BURNE, ELIHU BENJAMIN: statesman: 1816, Sep. 23—1887, Oct. 22; b. Livermore, Me.; bro. of Israel W. (1813-83) (q.v.); though he chose to spell his surname differently. He was a printer's apprentice 1833; then a school-teacher; was employed in the office of the *Kennebec Journal* in Augusta, Me., 1835; studied at Kent's Hill Seminary 1836; then studied law in Harvard Law School, and was admitted to the bar 1840. He began the practice of law in Galena, Ill., at the same time entering political life as a whig; soon he rose to distinction both as lawyer and as politician. He was representative in congress 1853, Dec.—1869, Mar., and was chairman of the house committee on commerce for 10 years. He earned the name 'watch-dog of the treasury' by his close scrutiny of all demands on the treasury. He was steadily opposed to the policy of granting to railroad corporations subsidies of public lands; and denounced as 'the greatest legislative crime in history' the law of congress that made the govt. mortgage on the Pacific railroad subordinate to the railroad companies' mortgage. He was appointed by Pres. Grant U. S. sec. of state in Grant's first term, but resigned to take the post of minister to France. He was minister during the war with Prussia; and before, during, and after the siege of Paris, as well as during the troubles of the Commune, was greatly influential in saving Americans and other foreigners from molestation. The German govt. made use of his good offices in various ways. W. had the respect and confidence of both the belligerent governments; and in a position of complex difficulties acquitted himself with a remarkable combination of delicate tact and forcible activity. After his return from France he resided in Chicago (where he died); and wrote a series of magazine articles, afterward published in a vol., *Recollections of a Minister to France* (1887, 2 vols.). W. edited a *History of the English Settlement of Edwards Co. (Ill.)*, and *The Edwards Papers*.

WASH'ING: act or operation of cleansing with water, with or without rubbing. The first essential is suitable water—in other words, *soft* water: see WATER-SUPPLY. Yellow Soap (q.v.), the kind chiefly used in washing linen, should not be very pale in color, or very low in price, because the soap-maker, in order to gratify the desire for a light color, is obliged to reduce the strength of good dark soaps with adulterants. Soap, as is well known, improves by keeping. Soft or potash soap is sometimes used to wash coarse things, on account of its being stronger than hard soap; but its smell is objectionable. Soda is easily procured good; and as the merit of washing-powders depends on the amount of alkali which they contain, to buy them is only a dear way of buying soda.

In arranging clothes for washing, it is desirable to sort them into kinds most suitable for washing together—such as lace, nets, and fine muslin into one heap; white body-linen into another; colored things of the nature of prints and gingham into another; and so on. It is desirable also to wash clothes as soon as possible after they are soiled.

WASHING.

Previous to washing, all white articles should be soaked for a night in cold water in which a little soda has been dissolved, as the steeping in alkaline water greatly aids in removing all dirt of a greasy nature. The clothes should then be washed twice in clean tepid water with sufficient supply of soap. If the water is quite cold, the dirt is taken off with difficulty; and if too hot, it is apt to fix the dirt into the fibre of the cloth. The clothes should next be examined for spots or stains, so as to remove them, if possible, by additional rubbing; after which they are boiled for at least 15 minutes in soap and water. Ink-stains or iron-molds require to be taken out with oxalic acid or the essential salts of lemon (oxalate of potash); and fruit-stains by boiling the stained parts with pearl-ash. After being boiled, the clothes are rinsed twice in cold water; and in the second rinsing a little stone-blue is added, to neutralize any yellowness occasioned by the washing. When this is done, they are wrung, and hung out to dry.

For the washing of flannels, it is even more desirable that the water should be soft than for linen or cotton; and it should contain no soda or potash in any form, as though a little alkali would more effectually remove dirt, yet it always turns woollens yellow, and at the same time thickens them. Rubbing, wringing, or squeezing is to be avoided, as tending to make woolen goods shrink, by facilitating their tendency to felt or mat into a thicker fabric. As to ladies' colored dresses of fine wool, such as merino, it is considered best to wash them in warm soft water with ox-gall, say a pint in a tubful of water. Ox-gall is a soap in its chemical nature, and it clears and brightens the colors.

The washing of printed cotton fabrics, especially muslins, is more difficult than formerly, on account of the fugitive nature of some of the dye-stuffs employed. The beautiful hues produced by the aniline or coal-tar colors, and by the archil lakes in imitation of them, have led to their extensive use in calico-printing, as well as in the dyeing of silk and wool. These dyes can scarcely be said to be permanent on any fabric; but on cotton they require to be fixed by mordants, such as albumen (white of egg), which will scarcely stand washing at all, and to which hot water is utter destruction. The same is true of some other dyes, such as the light blue produced by artificial ultramarine. If economy is to be studied, it is far better to have printed dresses done in fast colors—the reds and purples, from madder, e.g.—as they, though less attractive at first, can be washed without injuring their appearance. All such articles should be washed in soft warm water; that which has been used for flannels, if not too dirty, will do. When thoroughly cleaned, they are to be well rinsed in clean cold water, and not allowed to remain long in contact before they are hung up to dry.

White-silk articles, e.g., stockings and gloves, should be washed with soap, first in milk-warm, afterward in nearly boiling water. They will be improved if hung up for a short time in the fumes of burning sulphur (sulphurous acid) while still damp.

WASHING-MACHINE—WASHING OF FEET.

Washing by steam is largely practiced in some countries. The French chemist Chaptal first brought the process to perfection. Besides a saving of fuel, soap, and manual labor to the extent of at least one-half, the wear and tear of the linen attending rubbing and beating are avoided. The efficacy of steam in washing depends on its penetrating and dissolving property. The clothes are first steeped in a lye of soda or potash, or in a mixture of alkali and soap, and then hung in a wooden vessel kept full of steam by a pipe communicating with a boiler. On a small scale, a large cask, made air-tight, will answer, and a common tea-kettle will produce steam enough. There must be an aperture to allow the air to escape when the steam first enters; the air having been expelled, the aperture is shut. In half an hour the dirt is sufficiently loosened to wash out with ease, and the linen is found to be extremely white.

WASHING-MACHINE: machine or apparatus operated by hand or other power for cleansing soiled linen, woven fabrics, wool, etc. Washing-machines have of late years come into extensive use. A W.-M., when in motion, ought to produce at least as much agitation as will keep up a constant change in the deterging solution in contact with the linen, and at the same time cause the clothes to slide over each other in a manner somewhat analogous to that of hand-washing. An old form of W.-M. called the *dolly-tub*, long in use in some parts of England, consists essentially of a presser or dolly, which is simply a round thick disk of wood, say ten inches in diameter, with three to five legs rounded at the ends; the whole resembling a foot-stool, but with the addition of an upright rod or spindle from its centre, with a cross-piece at the top as a handle for working it. Any vessel, such as a tub, barrel, or box, may be used to hold the clothes, which are washed by moving the dolly first one way and then the other, at the same time exerting a certain pressure on them against the sides and bottom of the vessel.

Of recent washing-machines, a certain class are modifications of the dolly-machine, with spring-ribbed boards, on which the linen is rubbed by a swinging motion. Another class consist of boxes which also oscillate on an axis, but operate by jerking the clothes and water from side to side. A third, and perhaps the most efficient class, are made on the principle of the dash-wheel used in large bleach-works. In this machine the materials to be washed are lifted by internal ribs on the rim of a large wheel, and allowed to fall with some force from fully half its height into the cleansing liquid—this being of course repeated as the wheel rotates.

Washing-machines are classified in several divisions. The action may be (1) churning, (2) of the tumbling-barrel or dash-wheel type, (3) sluicing, when the hot water is forced through the tissue, (4) centrifugal, (5) twisting, (6) squeezing, (7) rubbing between vertical or other surfaces, smooth or corrugated, (8) rocking. No one machine can be described as a type of the many varying kinds.

WASHING OF FEET (ceremonial): see **FOOT-WASHING**.

WASHINGTON.

WASHINGTON, *wăsh'ing-ton*: state; one of the United States of America: 42d in order of admission into the Union, 29th admitted under the federal constitution; known as the Terr. of Washington 1853-1889, Nov. 11; popular name 'The Corner State.'

Location and Area.—W. is in lat. $45^{\circ} 32'$ — 49° n., long. 117° — $124^{\circ} 28'$ w.; bounded n. and n.w. by Brit. Columbia, e. by Ida., s. by Or., w. by the Pacific Ocean; extreme length e. to w. 360 m., extreme breadth n. to s. 400 m.; land surface 66,880 sq. m., water surface 2,300 sq. m., total 69,180 sq. m. (44,275,200 acres); timber-lands 20,000,000 acres, prairies and plains 10,000,000, alluvial bottom-lands 5,000,000; ocean coast-line about 180 m.; greatest elevation Mt. Rainier (3d highest mountain in the United states), 14,444 ft.; cap. Olympia.

Topography.—The Cascade Mountains divide the state into two nearly equal parts, known locally as E. W. and W. W. Between them and the ocean is the Coast Range, 3,000—5,000 ft. high. From the Coast to the Cascade Mountains a fine level tract of country extends e. 40-60 m., terminating in the water-shed of the Cascades, which are 5,000—8,000 ft. high. Thence high rolling prairies extend e. more than 200 m. to the base of the Blue Mountains. West W. is densely covered with timber, with small areas of open land, and East W. is a vast wheat-growing and stock-raising country. Owing to nature's prodigality in water-courses, no part of the state is remote from water transportation. Puget Sound is a vast inland sea (2,000 sq. m.), and besides there are the Strait of Juan de Fuca, Admiralty Inlet, Hood's canal, and other bays, harbors, and inlets, giving the state a shore-line of nearly 1,600 m. The most prominent bays and inlets, affording commodious and secure harbors, 2-8 m. long, 1-6 m. wide, with broad entrances, are Neah Bay, Port Discovery, Port Townsend, Port Ludlow, Port Madison, Port Gamble, Port Orchard, Port Blakely, Elliot Bay, Commencement Bay, Steilacoom, Budd's Inlet, Tunalip, Penn's Cove, Utsalady, and Bellingham. Next to San Francisco and Puget Sound, Gray's Harbor and Shoalwater Bay are the two largest harbors on the Pacific coast.—W. has 50 rivers of more or less commercial importance. The Columbia, which forms almost the entire boundary between W. and Or., traverses the state e. to w. and with its tributaries drains almost the whole state. Only 450 m. separate the navigable parts of the Columbia and the Missouri rivers, and the Snake Fork of the Columbia is navigable to within 150 m. of Great Salt Lake. Among the rivers that empty into Puget Sound are the Nesqually, Puyallup, Duwamish, White, Summanish, Snohomish, Snoqualmie, Stelaguamish, Skagit, Samish, and Nooksack—all navigable by steamboats; and Des Chutes, Cedar, and Skykonish—all non-navigable. Other important rivers are the Cowlitz, Lewis, Cathlapootle, Washougal, Takani, Spokane, and Okanogan.

Climate.—In East W. the summer heat is intense in the daytime; nights are invariably cool; winters short and severe; snow seldom falls before Christmas; spring begins

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in Feb., summer about May 15; average temperature 52°; mercury ranges 55°—70°. In West W. the mean temperature is 63° in summer and 30° in winter. Roses bloom in Seattle in Dec., pansies in Walla Walla in Jan., peaches blossom in Olympia in Feb., and snow-banks are frequently within sight of each place in Aug. West W. has two seasons, the dry and the rainy, the latter from late in Oct. till mid Apr. For the climate generally it is claimed that that of East W. is similar to that of France, and that of West W. like 'one produced by adding the mildness of Va. to the moisture of England.'

Geology.—The greatest natural wealth of the state is in its forests, and the largest article of export is the Oregon pine, more properly the yellow and red fir. This tree is sometimes 12 ft. in diameter and 300 ft. high, but the average saw logs are 20–60 in. in diameter. The timber-trees, in the order of importance, are the yellow and red fir; white and red cedar; spruce; larch; white pine; white fir; hemlock; bull pine; tamarack; alder and maple; ash and oak; cherry and laurel; and the cottonwoods. The pine attains a height of 160 ft., silver fir 150, black spruce 150, and white cedar 100. W. timber is exported to all parts of the world, and is valuable particularly in ship-building. The other economic properties are coal, chiefly bituminous; bog, magnetic, and brown hematite iron ore; gold; silver; copper; lead; cinnabar; limestone; sandstone; granite; marble; gypsum; kaolin; slate; and petroleum. The Cambrian and Silurian, eozoic, cretaceous, and tertiary formations predominate in West W.; the eozoic and tertiary in the n.e.; the volcanic in the central and s.e. portions; and the carboniferous in various parts of West W., especially in the vicinity of Bellingham Bay and Lake Washington.

Zoology.—The quadrupeds, birds, and fish are about the same as those in Oregon (q.v.); the Columbia river salmon is the same; and oysters are very abundant and of excellent quality, particularly in Shoalwater Bay.

Agriculture.—In 1880 the farm-lands covered 1,409,421 acres (of which 484,346 were improved); comprised 6,529 farms, valued with fences and buildings at \$13,844,224; contained implements and machinery valued at \$958,513, and live-stock valued at \$4,852,307; cost for repairs and new buildings \$300,548; and yielded products valued at \$4,212,750. The principal products were: barley 566,537 bushels; Indian corn 30,183; oats 1,571,706; wheat 1,921,322; hay 106,819 tons; Irish potatoes 1,035,177 bushels; wool 1,389,123 lbs.; butter 1,356,103; cheese 109,200; and orchard products valued at \$127,668. The live-stock comprised: 45,848 horses; 3,821 working oxen; 27,622 milch cows; 103,111 other cattle; 292,883 sheep; and 46,828 swine. Walla Walla co. yielded the most wheat, 779,907 bushels, with Columbia second, 425,879; Whatcom the most oats, 402,426 bushels, with Whitman second, 231,922; Columbia the most wool, 358,738 lbs., with Whitman second, 315,005; and Island the most potatoes, 202,010 bushels. In

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1891 the principal cereal productions were, oats 6,744,000 bu., 177,466 acres, \$2,764,920; and wheat 12,216,000 bu., 698,000 acres, \$9,161,775. The farm animals 1892 comprised 170,535 horses, value \$10,018,740; 1,371 mules, \$96,108; 96,605 milch cows, \$3,381,175; 447,690 oxen and other cattle, \$9,345,532; 686,521 sheep, \$1,858,824; and 152,144 swine, \$987,476—total head 1,554,866, value \$25,687,855.—In 1900 there were 33,202 farms, covering 8,499,297 acres, of which 3,465,960 acres were improved and 5,033,337 acres unimproved, and all farm property, including buildings, implements and machinery, and live stock, was valued at \$144,040,547. The production of the principal crops (1902) were: wheat 23,672,187 bu.; oats, 7,115,077 bu.; barley, 1,988,136 bu.; potatoes, 4,255,168 bu.; hay, 739,359 tons; rye, 147,748 bu.; corn, 230,322 bu.

Manufactures.—W. had (1880) 261 manufacturing establishments, employing 1,147 hands, using \$3,202,497 capital, paying \$532,226 in wages, using materials valued at \$1,967,469, and yielding products valued at \$3,250,134. The chief industry, according to capital employed, was lumber-sawing, which had 37 establishments, \$2,456,450 capital, 499 hands, \$200,539 wages, \$1,188,075 materials, and \$1,734,742 products. All other industries combined had 224 establishments, \$746,047 capital, 648 hands, \$331,687 wages, \$779,394 materials, and \$1,515,392 products. In 1888 nearly 5,000 men were employed in the great saw-mills at Seattle, Tacoma, Utsalady, Port Gamble, Port Blakely, Port Madison, Port Discovery, and Seabeck; the mills had a total capacity of 750,000,000 ft. per annum; and the total cut of the year was 706,985,000 ft., valued at \$7,776,935. The lumber industry was the most important one in the state 1890, and next to it was the manufacture of flour, for which there were 75 mills, with a total capacity of 500,000 barrels per annum. Spokane Falls was the centre of the industry, and Ellensburg had a number of mills in its vicinity. W. had (1900) 3,631 manufacturing establishments, employing \$52,649,760 capital and 33,806 persons, paying \$49,099,182 for materials used and \$19,106,873 for wages, and yielding products valued at \$86,795,051.

Mines and Quarries.—The earliest discovery and first working of coal were near Bellingham Bay, in the n. part of the state. These mines proved profitable for many years, but of late other and better coals have been found in localities more accessible to markets. The extent of the coal-measures is believed to approximate 180,000 acres, and all the fields in the w. part of the state are within 40 m. of tide-water. The total production in 1901 was 2,578,217 short tons, valued at \$4,271,076. Seven counties produced coal. Some of the W. coals approach anthracite in character. The principal fields were on the w. slope of the Cascade range, in the vicinity of Puget Sound, in King, Pierce and Skagit cos., and in Kittitas co., on the e. slope. The coals are lignite, semi-bituminous, and bituminous, adapted for coking, gas, steam, and domestic purposes.

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In 1890 there were 8 quarries of limestone, \$584,825 capital, \$211,418 expenses, and \$231,287 in value of products, which included 15,970 cubic ft. of building stone, 7,000 tons for furnace flux, and 222,759 barrels of lime. Of sandstone there were 5 quarries, which had \$78,700 capital, \$54,955 expenses, and \$75,936 in value of products, which comprised 540,039 cubic ft. of stone, all cut for building purposes.

Mines and quarries of gold, silver, lead, iron, nickel, marble, granite and slate contribute to the mineral products; val. gold mined, 1901, \$580,500; silver, \$445,285.

Fisheries.—In 1890 more than one-quarter of the aggregate number of employes in the Pacific fisheries were engaged in the industry in W. The capital invested was \$1,517,397, hands employed 3,830, value of catch \$890,860. Of the total hands 283 were vessel fishermen, 2,571 shore fishermen, and 976 shoremen, factory hands, and helpers; of the total capital \$71,600 were in 17 vessels and \$31,520 in their outfits, \$145,880 were in 1,202 boats, \$402,177 were in stock of apparatus, and \$866,220 in shore property and cash capital; and of the total products \$763,108 were in fish, \$90,844 in mollusks and crustaceans, \$32,908 in whale and seal products, and \$4,000 in all other products. There were 21 salmon-canning factories. In 1902 the capital invested in fisheries was \$6,819,818; val. output \$6,730,870; cases of salmon packed, \$777,484; number whites employed 7,615; Chinese and Japanese 2,055. The principal fishing localities are Chehalis river and Gray's Harbor, Columbia river, Puget Sound, and Shoalwater Bay. This industry had a large advance since 1880, especially in the oyster and salmon fisheries.

Commerce.—W. comprises one U. S. customs district, with port of entry at Port Townsend (q.v.). In the year ending 1891, June 30, the imports of merchandise were \$476,962; domestic exports \$5,727,177; foreign exports \$2,317; and exports of domestic coin and bullion \$137,515. Of the total imports \$329,656 were dutiable; \$147,306 non-dutiable; \$471,146 imported direct from foreign countries; \$472,743 entered for immediate consumption; \$14,460 brought in cars and other land vehicles; \$232,468 in American steam-vessels; \$39,071 in American sailing-vessels; \$33,442 in foreign steam-vessels; and \$157,521 in foreign sailing-vessels. Of the total exports \$889,007 were sent in American steam-vessels; \$1,057,522 in American sailing-vessels; \$63,639 in foreign steam-vessels; and \$3,717,009 in foreign sailing-vessels. Of vessels engaged in foreign trade the entrances were 1,208 American steamers of 854,000 tons and 72 foreign steamers of 15,208 tons—total steamers 1,280, tonnage 869,208; and the clearances were 1,256 American steamers of 880,405 tons and 71 foreign steamers of 14,550 tons—total steamers 1,327, tonnage 894,955. Of vessels of all kinds the entrances were 1,308 American of 944,219 tons and 173 foreign of 134,009 tons—total vessels 1,481, tonnage 1,078,228; and the clearances were 1,412 American of 1,021,665 tons and 179 foreign of 138,490—total vessels 1,591; tonnage 1,160,155. The imports of

merchandise, 1902-03, June, were valued at \$12,177,243; exports \$32,500,013; wheat exported 8,928,909 bush., val. \$6,720,606; value total breadstuffs, \$13,574,008; val. gold exported \$3,983,438; silver \$1,105,713.

Railroads.—The railroad development in the state has been rapid. In 1882 there were 480 m. in operation; (1886) 900; (1888) 1,302; (1889) 305 m. of new road were completed, and 450 m. more were under construction; (1890) 1,783.37 m. in operation; (1901) 3,005.

Religion.—The Meth. Episc. Church is the strongest in W. It reported 1889, besides German, Norwegian, and Danish missions, the Columbia river conference, which had the Spokane, Dalles, and Walla Walla districts, 75 local and 56 travelling preachers, 56 churches, 33 parsonages, 4,280 members, 82 Sunday schools, 649 officers and teachers, 4,327 pupils, value of church property \$176,900, parsonages \$28,775, and \$33,181 contributions for ministerial support; and the Puget Sound conference, which had the Olympia and Seattle districts, 37 local and 47 travelling preachers, 56 churches, 28 parsonages, 3,783 members, 87 Sunday schools, 768 officers and teachers, 4,379 pupils, value of church property \$225,350, parsonages \$36,300, and \$31,232 contributions for ministerial support—total, 2 conferences, 5 districts, 112 local and 103 travelling preachers, 112 churches, 61 parsonages, 8,063 members, 169 Sunday schools, 1,417 officers and teachers, 8,706 pupils, value of church property \$402,250, parsonages \$65,075, and \$64,413 contributions.

The Bapt. churches reported (1892) 7 regular and 1 un-associated assocs., 101 ministers, 109 churches, 5,368 members, 81 Sunday schools, 739 officers and teachers, 2,528 pupils, church property valued at \$285,285, and aggregate contributions \$78,390.

The Presb. Church in the U. S. of A. reported 1890 the synod of W., which comprised the presbyteries of Alaska, Ida., and Olympia and Puget Sound in W. The last two and the part of Ida. in W. had 63 ministers, 87 churches, 4,195 members, 4,241 Sunday-school members, and contributions of \$110,581 for congregational purposes, \$6,855 for church erection, and \$4,942 for miscellaneous purposes.

The Congl. churches reported (1891) 69 ministers, 93 churches, 2,661 members, 2,876 families, 5,143 Sunday-school members, and contributions of \$74,472 from 67 churches for home expenditures.

The Prot. Episc. Church reported 1892 the missionary jurisdiction of W., with 1 bp., 28 clergy, 45 parishes and missions, 2,215 communicants, 148 Sunday-school teachers, 1,461 pupils, \$60,219 contributions, and the Fanny C. Pad-dock Memorial Hospital, Tacoma, Grace Hospital, Seattle, the Annie Wright Seminary, Tacoma, Washington College, Tacoma, St. Mary's School, Spokane Falls, and St. Luke's parish school, Vancouver.

The Rom. Cath. Church reported 1892 the diocese of Nesqually (established 1850), comprising the whole state, with 1 bp., 49 priests, 60 churches, 99 chapels and stations, 3 colleges, 16 academies, 11 parochial schools,



Paper Nest of the Social Wasp



One of the Solitary Species (*Eumenes Smithii*).



Polistes and Nest

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1,035 pupils, 18 charitable institutions, and estimated Rom. Cath. pop. 40,000.

At the tenth international Sunday-school convention, at Denver, 1902, June 26-30, there were reported in W. 1,451 Sunday schools, 11,106 officers and teachers, 81,575 scholars, total members 94,648.

Education.—In 1880 W. had 14,780 children enrolled in the public schools, of whom 10,546 were in average daily attendance. There were 531 public schools, 5 high schools, 487 school buildings, 199 male and 333 female (532) teachers, school property valued at \$161,309, receipts \$120,549, and expenditures \$112,615. In the school year ending 1890, June, there were 87,813 children of school age (5-21 years) in the state, of whom 55,964 were enrolled in the public schools and 2,443 in private schools. Of the public-school enrolment, 36,946 were in average daily attendance. There were 1,126 public-school buildings, 104 public graded schools, and 112 private schools. The public schools had 1,610 teachers, \$1,824,130 invested in grounds, buildings, furniture, and apparatus, \$1,235,717 in total receipts, \$948,397 (including \$428,755 paid teachers) in total expenditures, and \$287,319 balance. The legislature passed laws 1889-90 for the establishment of state normal schools at Ellensburg and Cheney, of a state agricultural college and school of science, and of a state reform school near Chehalis. A state school for defective youth was Already in operation at Vancouver—Official reports 1892 showed total school census (1891) 100,052; enrolment 69,737, and average daily attendance 45,222. There were 1,275 school-houses, with seating capacity of 78,063. School teachers of both sexes numbered about 2,000. The current expenses, of the year aggregated \$932,491; expenditures on buildings, furniture, interest on bonds, etc., \$1,209,305. In 1902 W. had 123,391 children enrolled in the public schools, of whom 81,400 were in average daily attendance, and 3,869 teachers. The Univ. of W., which is the oldest institution of learning n. of the Columbia river, was opened 1862, and had (1902) 35 professors and instructors, 601 students, 16,000 volumes in the library, valued at \$15,000, \$35,000 in scientific apparatus, and \$658,500 in grounds and buildings.

The universities and colleges for higher education 1901 were Vashon College, Burton, (non-sect.), 14 profs, and inst., 115 stud., 1,329 vol. in the library, \$35,000 in grounds and buildings, and \$4,000 in scientific apparatus; Univ. of Washington, Seattle (non-sect.); Gonzaga College, Spokane (R. C.), 21 profs. and inst., 250 stud., 10,000 vol. in the library, \$300,000 in grounds and buildings, and \$3,000 in scientific apparatus; Puget Sound Univ., Tacoma (M. E.), 8 profs. and inst., 85 stud., 3,000 vol. in the library, \$20,000 in grounds and buildings, and \$5,000 in scientific apparatus; Whitworth College, Tacoma (Presb.), 9 profs, and inst., 79 stud., \$125,000 in grounds and buildings, 7,000 vols. in the library, and

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\$1,000 in scientific apparatus; St. James College, Vancouver (R. C.), 7 profs. and instructors, 70 students, 8,000 vols. in the library, and \$10,000 in grounds and buildings; Whitman College, Walla Walla (non-sect.), 17 professors and instructors, 303 students, 8,000 volumes in the library, \$60,000 in grounds and buildings, and \$10,000 in scientific apparatus:—total 7 institutions, 116 professors and instructors, 1,508 students, 49,849 volumes in the libraries, valued at \$54,000; \$1,308,500 in grounds and buildings, \$66,000 in scientific apparatus, and \$200,000 in productive funds. Other educational institutions included Walla Walla College, Woodcock Academy, Providence Academy, Pacific Lutheran University, Seattle Seminary (Seattle), Academy of the Holy Names (Seattle), Seattle Seminary (Ross), Puget Sound Academy, College of Our Lady of Lourdes, Academy of Holy Names (Spokane), Brunot Hall, Annie Wright Seminary, Tacoma Academy, Waitsburg Academy, and De La Salle Institute.

Illiteracy.—Persons 10 years old and upward enumerated (1880) 55,720, unable to read 3,191, unable to write 3,889, whites unable to write 1,429; foreign-born whites enumerated 11,991, unable to write 534; whites 10–14 years old enumerated 6,955, unable to write 330; males 207, females 123; whites 15–20 years old enumerated 6,700, unable to write 88: males 59, females 29; whites 21 years old and upward enumerated 35,614, unable to write 1,011; males 642, females 369; colored persons 10 years old and upward enumerated 6,451, unable to write 2,460; colored 10–14 years old enumerated 662, unable to write 247; males 135, females 297; colored 15–20 years old enumerated 1,236, unable to write 329: males 191, females 138; colored 21 years old and upward enumerated 4,553, unable to write, 1,884: males 1,126, females 758. In 1900 there were 12,740 illiterates, of whom 1,374 were native white.

Finances and Banking.—In 1880 W. had no terr. debt but had co. debt \$204,384, and city and town debt \$34,927—total \$239,311; and an assessed real valuation \$11,335,923 and personal \$12,474,770—total \$23,810,693.—The total bonded debt 1902, Dec. 30, was \$50,000, and the floating \$45,488. The assessed valuation of property 1902, Oct. 31, was, real \$198,200,934, personal \$45,888,131, total \$260,940,138, of which \$16,851,073 was railroad; increase in two years \$23,457,015. The national banks numbered 33, with \$3,280,000 capital.

History.—The history of W., from the earliest discoveries in that region till the organization of the terr. of W., is identical with that of Oregon (q.v.). The terr. of W. was organized 1853, and comprised all of Or. n. of the Columbia river toward the w., and n. of lat. 46° toward the e., or what was then known as 'the Vancouver district.' In 1855–58 the settlers experienced much trouble from the Indians; in 1855 gold was discovered on Fraser's river, to which a rush of miners and adventurers was made 1857–8; and 1863 W. lost a considerable portion of its area by the organization of the terr. of Ida., a part of which also had

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belonged to Ore. It was admitted into the Union as a state 1889, Nov. 11.

Government.—The executive authority is vested by the constitution (1889) in a gov., lieut.gov., sec. of state, treas., auditor, atty.gen., supt. of public instruction, and a commissioner of public lands, all elected for 4 years. The legislative authority is vested in an assembly, comprising (1903) a senate of 42 members, elected for 4 years and a house of representatives of 84 members, elected for 2 years.—The legislature is prohibited from authorizing any lottery, granting any divorce, engaging in private and special legislation, and was charged by the constitution with the provision of laws for specified state interests. Consolidation of competing lines of railroad is forbidden: monopolies and trusts are prohibited; the legislature may provide for woman suffrage at school elections; the ownership of lands by aliens is prohibited, excepting where acquired by inheritance, under mortgage, or in good faith in the ordinary course of justice in the collection of debts; and the sessions of the legislature after the first one are limited to 60 days. The gov. is given authority to veto separate sections of any bill. All male persons 21 years old who are citizens of the United States, residents of the state one year, the co. 90 days, and the city, town, ward, or precinct 30 days, and all male persons who were qualified electors of the terr. at the time of the adoption of the constitution, are eligible to vote. While the right of trial by jury is to be maintained inviolate, the constitution gives the legislature authority to provide for a jury of any number less than 12 in courts not of record, for a verdict by 9 or more jurors in civil cases in any court of record, and for waiving of the jury in civil cases where the consent of the parties interested is given thereto.—The judicial authority is vested in a supreme court of a chief-justice and 7 assoc. justices, and the usual minor courts and officers. 1901, Jan. 1, there were in W. 860 post-offices, of which 3 were first-class, 6 second-class, 38 third-class, 47 presidential, 813 fourth-class, 409 money-order offices, and 24 money-order stations.

The successive govts., with their terms of service, are as follows: Isaac I. Stevens 1853-57; J. Patton Anderson 1857; Fayette McMullin 1857-61; Richard D. Gholson 1861; Wm. H. Wallace 1861; Wm. Pickering 1861-67; Marshall F. Moore 1867-69; Alvin Flanders 1869-70; Edw. S. Salomon 1870-1; Jas. F. Legate 1871-2; Elisha P. Ferry 1872-80; Wm. A. Newell 1880-84; Watson C. Squire 1884-87; Eugene Semple 1887-89; Miles C. Moore 1889-90; Elisha P. Ferry 1890-93; John H. McGraw 1892-97; John R. Rogers 1897-1901; Henry G. McBride 1901-05.

Counties, Cities and Towns.—W. was divided (1900) into 36 counties, an inc. of 11 since 1880, when the most populous *counties* were: Walla Walla 8,716; Columbia 7,103; Whitman 7,014; King 6,910; Clarke 5,490; Spokane 4,262; Klickitat 4,055; Pierce 3,319; Thurston 3,270; Whatcom 3,137; Yakima 2,811; Lewis 2,600; and Cowlitz 2,062; and *cities and towns*: Walla Walla 3,588; Seattle

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3,533; Vancouver 1,722; Olympia 1,233; Tacoma 1,638; and Port Townsend 917. In 1900 the most populous *counties* were: King 110,053; Spokane 57,542; Pierce, 55,515; Whitman 25,360; Whatcom 24,116; Snohomish 23,950; Walla Walla 18,680; Lewis 15,157; Chehalis 15,124; Skagit 14,272; Yakima 13,462; Clarke 13,419; and Lincoln 11,969; and *cities and towns*: Seattle 80,671; Tacoma 37,714; Spokane Falls 36,848; Walla Walla 10,049; Everett 7,838; New Whatcom 6,834; Fairhaven 4,228; Ballard 4,568; Olympia 3,863; Port Townsend 3,443; and North Yakima 3,154.

Politics.—State elections are held on the first Monday in Nov. in even-numbered years, congressional and presidential elections on Tuesday after the first Monday in Nov. The state govt. (1903) was republican in state officers and legislature, with a party majority in the latter of 24 in the senate, 68 in the house, and 92 on joint ballot. As a terr. W. had one representative (delegate) in congress. Under the apportionment on the 1900 census the state has 4 electoral votes and 3 representatives in congress. For the presidential vote, see PRESIDENT AND VICE-PRESIDENT, ELECTION OF.

Population.—(1860) 11,594; (1870) whites 22,195, colored 1,760—total 22,955; (1880) whites 67,199, colored 7,917—total 75,116; (1890) whites 340,513, colored 1,602—total 342,115; (1900) whites 515,589; colored 2,514—total 518,103.

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WASHINGTON: city, cap. of the United States of America, in the District of Columbia; on the Potomac river, between the Anacosta, or the e. branch, and Rock creek on the w.; and on the Baltimore and Ohio, the Baltimore and Potomac, and the Virginia Midland railroads; originally known as 'The Federal City,' afterward named in honor of Gen. George Washington; popularly known as 'The City of Magnificent Distances.'

It is on the e. bank of the river; about lat. $38^{\circ} 53' 39''$ n., long. $77^{\circ} 2' 48''$ w. of Greenwich; 39 m. s.w. of Baltimore, 106 m. n.w. of the mouth of the Potomac, 137 m. s.w. of Philadelphia, 226 m. s.w. of New York; extreme length $4\frac{1}{2}$ m., extreme breadth $3\frac{1}{2}$ m.; circumference 14 m.; area $9\frac{1}{2}$ sq. m.; mean elevation above the river 40 ft., highest 104 ft.

The city was laid out expressly for the national cap., on a site personally selected by Pres. Washington in the tract ceded to the federal govt. by Md. and Va. for a federal district (see DISTRICT OF COLUMBIA), and under authority of an act of congress 1790, July 16. In the following year the city was laid out by Pierre Charles L'Enfant (q.v.), under the direction of Messrs. Johnson, Stuart, and Carroll. In 1800 the work had so far advanced that the seat of govt. was removed hither from Philadelphia; and Nov. 17 congress held its first session in the new city. Maj. L'Enfant based his plans of the city on those of Versailles, and they were followed substantially in the subsequent development. The corner-stone of the Capitol, designed by Dr. William Thornton, was laid by Pres. Washington 1793, Sep. 18, and when congress took possession of it two wings were up, but only the n. one was finished, and both branches of congress were crowded into that. The White House exterior was finished, but workmen were still engaged on the interior.

W. occupies a tract of about 6,100 acres. The streets run n., s., e., and w., and extending across them diagonally are two series of avenues. one radiating from the Capitol, the other from the White House. In 1900 there were 21 such avenues, each named after a state, of which 19 were 120-160 ft. wide and 2 were 85 ft. Pennsylvania ave. extends across the city, and is interrupted in its course by the buildings and grounds of the Capitol and the White House; between these buildings it is 160 ft. wide, and in the rest of its course it is 130 ft. Massachusetts ave. runs parallel with Pennsylvania ave., and is 160 ft. wide its entire length. Excluding the avenues, the streets are laid out at right angles to one another; those n. and s. of the Capitol have alphabetical designations, as A North. B South, etc., and those e. and w. of it have numerical designations, as First E., Second W., etc. There were in all more than 300 public reservations, with area of nearly 400 acres, exclusive of the Botanical Garden, the Soldiers' Home, the grounds of the Dept. of Agriculture, the Zoological Park, and Rock Creek Park (2,000 acres); these reservations are known as parks, squares, circles, and triangles. Of the total reservations, some are unimproved, others are in the highest state of improve-

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ment. These reservations include the 'Mall,' extending from the Capitol to the Washington Monument ($1\frac{1}{2}$ m.), containing about 200 acres, and divided into the Botanical Garden grounds (10 acres), Seaton and Henry Parks (34), Smithsonian Park (52), Agricultural Grounds (40), and Monument Park (78); White Lot; President's Park; Lafayette Square; McPherson Square; Thomas Circle; Scott Circle; Farragut Square; Dupont Circle; Iowa Circle; Franklin Square; Mount Vernon Square; Judiciary Square; Washington Circle; Stanton Square; Lincoln Park; and Garfield Park. The squares and circles bearing personal designation contain, in nearly all cases, statues of the persons named; and most of the others contain the govt. buildings. The Botanical Garden has a bronze Bartholdi fountain; the Smithsonian Park contains the Smithsonian Institution, National Museum, the Army Medical Museum, and a statue of Joseph Henry (q.v.); the grounds of the Dept. of Agriculture contain the main building, the museum, the conservatory, and a number of minor buildings; Monument Park contains the Washington Monument (555 ft. high) and 15 greenhouses (covering 23,347 sq. ft.); Judiciary Square contains the City Hall and the Pension Office building; and Lafayette Square, an equestrian statue of Andrew Jackson, a new Lafayette monument, and two magnificent bronze vases. Another distinct feature of W. streets are the highly ornamented stretches of ground known as parkings. In the improvement of the city under Pres. Grant's administration, many of the unusually wide avenues and streets had the roadways narrowed, and the space thus gained was placed at the disposal of persons owning the abutting property for such ornamentation as they personally chose to give to it, the city retaining title to the strips. These parkings vary from 15 to 30 ft. in width. In 1890 the avenues, streets, and public reservations were ornamented with 67,967 trees, all of choice selection and the majority of native origin.

The most noted building is the National Capitol, on Capitol Hill. It is a classic structure, 751 ft. 4 in. long and 121-324 ft. deep, covering $3\frac{1}{2}$ acres; and consists of a central building and two wings, the latter ornamented on the e. façades with 68 Corinthian columns. The central structure is of Va. freestone, the wings of Mass. white marble, and the fluted columns of Va. marble. A marble terrace, begun 1882 and completed 1892, extends along the entire w. front and the n. and s. ends; is 66 ft. wide; has a frontage (with projections) of more than $\frac{1}{2}$ m.; and cost \$730,000. In the interior of the terracc are 98 storage-rooms and 24 handsomely furnished committee-rooms, divided equally between the senate and house of representatives. A dome of iron $135\frac{1}{2}$ ft. in diameter springs from the central structure, is surmounted by a lantern 50 ft. high and 15 ft. in diameter, and is crowned by a bronze statue of Liberty, $19\frac{1}{2}$ ft. high, by Thomas Crawford (q.v.). The crest of the statue is $285\frac{1}{2}$ ft. above the base of the building. The present Capitol was built on the site of the first one, burned by the British 1814, Aug.; the central structure was completed

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1827, the senate or n. wing 1859, and the representatives' or s. wing 1857; and the total cost was about \$14,000,000. Beneath the great dome is the rotunda, 135½ ft. in diameter, and rising 241 ft. above the roof of the main building, 307½ ft. above the base-line, and 377 ft. above low tide. The senate chamber is n. of the rotunda, 113½ ft. long, 80½ ft. wide, 36 ft. high; and the hall of the representatives is s. of the rotunda, 139 ft. long, 93 ft. wide, 36 ft. high. Also south is the old hall of representatives, now used as a national statuary hall, with accommodations for two statues from each state of its most distinguished citizens: this hall is semicircular, 96 ft. long, 57 ft. high, and has 24 columns of W. Va. marble. The Capitol contains also the U. S. Supreme-court Room, the Marble Room, the President's Room, and the Congressional Library; and is decorated with paintings, frescoes, sculptures, and statuary of great value and large historical interest.

The building of the Treas. Dept., on Pennsylvania ave. and 15th st., is Ionic in style, 468 ft. long and 264 ft. wide, and cost \$6,000,000; the new building of the State, War, and Navy Depts., w. of the White House, is of granite in the Roman Doric style, 567 ft. long, 342 ft. wide, and 4 stories high, with imposing n., e., s., and w. façades, and cost about \$11,000,000; the Patent Office building, known officially as the building of the Dept. of the Interior, occupies an entire square, is modelled after the Pantheon, is 453 ft. long, 331 ft. wide, and 75 ft. high, and cost \$2,700,000; the Post-office Dept. is in a Md. marble Corinthian building opposite the Patent Office, 300 ft. long and 204 ft. wide, and cost \$1,700,000; the Dept. of Agriculture is in a brick Renaissance building adjoining the Smithsonian Institution, 170 ft. long by 61 ft. wide. For the magnificent new library, see CONGRESS, LIBRARY OF.

The White House, the popular name of the president's home and private offices, and officially known as the Executive Mansion, is on Pennsylvania ave. between the buildings of the Treasury and of the State, War, and Navy Depts.: it was built of freestone painted white, 170 ft. long and 86 ft. wide, and is in a plot of 20 acres beautifully laid out and ornamented. It is the second executive mansion, the first having been burned with the first Capitol by the British 1814; and was rebuilt 1818-29. The building contains several widely known reception-rooms, notably the East and Blue Parlors, state dining-room, and the private apartments of the president's family. Among other prominent buildings and institutions of a public character are the Soldiers' Home, with its ample grounds and tasteful cottages; the U. S. Naval Observatory the equatorial telescope in which has a 26-in. object-glass, cost \$47,000, and is one of the largest refractors in the world; the Corcoran Art Building; the Navy-yard, formerly used for building war-vessels, now for manufacturing ordnance; the Washington Monument, begun 1848, completed and dedicated 1885, height 555 ft. 5½ in., base of shaft 55 ft. 5½ in. sq., top at base of pyramid 34 ft. 5½ in. sq., cost \$1,187,710; Columbia Institute for the Deaf and Dumb; U. S. Hospital

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for the Insane; Smithsonian Institution (q.v.); Columbia Hospital for Women; National Soldiers' and Sailors' Orphans' Home; Washington Orphan Asylum; and the Freedmen's Hospital. Prominent charitable institutions are the Louise Home, endowed by William W. Corcoran (q.v.) for indigent gentlewomen; St. Joseph's and St. Vincent's orphan asylums, St. Ann's Infant Asylum, Asylum of the Little Sisters of the Poor, Providence Hospital, House of the Good Shepherd (all Rom. Cath.); and St. John's Orphanage, Lenthall Home for Widows, House of Mercy (all Prot. Episc.).

W. is lighted with gas and electricity; is supplied with water by an aqueduct from the Great Falls of the Potomac, 16 m. distant (cost \$3,500,000); has the Central, Northern Liberty, and several smaller markets; several cemeteries, of which the Congressional, Oak Hill, Glenwood, Rock Creek, and Mount Olivet, are the most ornate; and the Long, Aqueduct, Little Falls, Navy-yard, and Benning's bridges, across the Potomac and the Anacosta.

The govt. of W., together with that of the entire District of Columbia, is administered directly by the federal govt. through a board of three commissioners; and no separate reports are made of W. In 1902 there were 12 national banks (cap. \$3,027,000); 5 loan and trust companies (cap. \$4,550,000; 23 private banks (cap. \$510,025), and 5 state banks (cap. \$253,000), and 3 daily, 31 weekly, 3 bi-monthly, 2 semi-monthly, 35 monthly, and 3 quarterly publications, exclusive of those issued by the various depts. of the govt. In 1891 there were 193 churches, divided as follows: Meth. Episc., 22 white, 28 colored; Prot. Episc. 22 white, 3 colored; Presb. 16 white, 1 colored; Rom. Cath. 13 white, 1 colored; Bapt. 11 white, 36 colored; Luth. 11; Meth. Prot. 6; Congl. 4 white, 2 colored; Meth. Episc., S., 3; Friends 2; Hebrew 2; Ref. 2; Disciples, Christadelphians, Swedenborgian, Unit., and Univ., each 1. In 1900 there were 234 churches.

The advanced educational institutions are: Columbian Univ. chart'd 1821 (Bapt.) which had (1902) 175 profs. and instructors, 1,420 students, 12,000 vols. in library, \$1,000,000 value in grounds and buildings, \$256,075 in productive funds, and \$102,225 income; pres. Chas. W. Needham, LL.D.; Georgetown Univ. (W. Washington), opened 1789 (R. Cath.), 120 profs. and instructors, 750 students, 85,600 vols. in library; pres. Rev. Jerome Daugherty, S.J.; Gonzaga Coll., opened 1821 (R. Cath.), 12 profs. and instruc., 159 students, 10,000 vols. in library, \$500 in scientific apparatus; Howard Univ., 1867 (non-sect.), 60 profs. and instructors, 1,000 students, 15,000 vols., \$500,000 in grounds and buildings, \$16,000 in productive funds, \$48,500 income; pres. J. Eames Rankin, D.D., LL.D.; Gallaudet Coll., 1864 (non-sect.), 15 profs. and instructors, 113 students, 4,510 vols., \$700,000 in grounds and buildings, total income \$74,295, pres. E. M. Gallaudet, PH.D., LL.D.; Catholic Univ. of America, founded 1884, 28 profs. and instructors, 155 students, 40,000 vols. in library, pres. Thomas J. Conaty,

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D.D.: St. John's College (R. C.), 11 profs., 161 students, 4,000 vols. in library, pres. Rev. Bro. Abdas, F.S.C.: the American Univ. (M. E.), organized 1891, has a site 2 m. from the city. Carnegie Institution, founded 1902, with endowment fund of \$10,000,000, co-operates with other institutions of learning.

Strangers visiting W. will economize time by observing the following itinerary: Pennsylvania ave., the Capitol, Treasury building, White House, State, War, and Navy building, Corcoran Art Building, Bureau of Engraving and Printing, Washington Monument, Smithsonian Institution, National Museum, Agricultural building, Fish Commission building, Botanical Gardens, Navy-yard, Arlington, Soldiers' Home, and Mount Vernon. During business hours in the 'season,' all govt. buildings are open to the public free of charge.

W., as a grand spectacle of natural and cultivated beauty, is seen at its best in early summer; and as a panorama of American official life, during the sessions of congress. Pop. permanent (1880) 177,624; (1900) 278,718.

WASHINGTON: cap. of Daviess co., Ind.; on the Ohio and Mississippi and the Evansville and Terre Haute railroads: 20 m. e. of Evansville, equidistant from Cincinnati and St. Louis. It is engaged in coal-mining and in manufacturing, having 7 large cannel and bituminous mines in operation, and several woolen factories, flour-mills, and foundries and machine-shops. It also makes large shipments of live-stock. W. contains 9 churches, 2 national banks (cap. \$100,000), and 3 daily and 3 weekly newspapers. Pop. (1880) 4,323; (1890) 6,064; (1900) 8,551.

WASHINGTON: city, cap. of Washington Co., Io.; on the Chicago Rock Island and Pacific and the Burlington and Northwestern railroads; 75 m. s.w. of Davenport. It contains co. court-house; 11 churches; public schools; acad.; Rom. Cath. school; public library; banks, national, savings, and private; periodicals, 1 daily and 3 weekly; grain elevators; pipe organ works; carriage-works; mills, etc.; and is the centre of trade for a large agricultural region. Pop. (1890) 5,000; (1900) 4,255.

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WASH'INGTON: cap. of Fayette co., O.; on Sugar creek, and on the Cincinnati and Muskingum Valley, the Colorado and Cincinnati, the Dayton Fort Wayne and Chicago, and the Ohio Southern railroads; 35 m. s.e. of Springfield, 77 m. e.n.e. of Cincinnati. It is in an agricultural region, and manufactures agricultural implements, boots and shoes, lumber, and woolen goods. There are 7 churches and 1 daily and 4 weekly newspapers.—Pop. (1880) 3,798; (1890) 5,742; (1900) 5,751.

WASH'INGTON: cap. of Washington co., Penn.; on Chartiers creek, and on the Baltimore and Ohio, the Pittsburgh Cincinnati Chicago and St. Louis, and the Waynesburg and Washington railroads; 32 m. s.s.w. of Pittsburgh, 32 m. e.n.e. of Wheeling. It is engaged in bituminous coal-mining; is the seat of Washington and Jefferson College (Presb.), organized 1802; and contains 10 churches, courthouse, manufactories of flour, cigars, carriages, and woolen goods, and 2 daily, 1 semi-weekly, 2 weekly, and 1 monthly periodicals. Pop. (1880) 4,292; (1890) 7,063; (1900) 7,670.

WASH'INGTON, BOOKER TALIAFERRO: educator: b. Hale's Ford, Va. 1856, Apr. 18. He is of African descent, and was born a slave. With much difficulty and hard work he saved enough to take him through Hampton Institute, graduating 1875, and entering Wayland Seminary the same year. Before completing his course at Wayland, he was elected a teacher at Hampton. In 1881 W. was made pres. of the Tuskegee (Ala.) Institute. Under his management this school has grown from 1 teacher and 30 students to (1902) 112 teachers and more than 1,300 students and 598 graduates. Its property in lands and buildings was (1902) valued at \$357,000.

WASH'INGTON, BUSHROD, LL.D.: jurist: 1762, June 5—1829, Nov. 26; b. Westmoreland co., Va.; son of John Augustine W., who was bro. of Gen. George W. Having graduated at William and Mary College 1778, he studied law and began practice in Westmoreland co. Before completing his law studies he entered the military service as a private soldier. He was member of the Va. house of delegates 1787, and of the Va. convention that ratified the federal constitution 1788. He became associate justice of the U. S. supreme court 1798. W. was the first pres. of the Colonization Soc. After the death of the widow of Gen. George W., Bushrod W., the general's favorite nephew, came into possession of the Mt. Vernon mansion, with 400 acres of land.—He pub. *Reports of Cases argued and determined in the Court of Appeals of Va.* (2 vols. 1798–9); *Reports of Cases determined in the Circuit Court of the United States for the 3d Circuit* (4 vols. 1826–29).

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WASHINGTON, GEORGE: first President of the United States: 1732, Feb. 22—1799, Dec. 14; b. Pope's Creek, Westmoreland co., Va.; descendant of John W., native of England, who emigrated to Va. 1657, and who was an extensive planter and a county magistrate, residing at Pope's Creek. In honor of John W., the parish of his residence got the name Washington. George W.'s father, Augustine W. (d. 1743), was grandson of John W.; George W.'s mother, Mary Ball, was second wife of Augustine W.; she was left a widow 1743, when W. was 12 years old; he was the eldest of the 5 surviving children of the second marriage. The family then lived on an estate on the n. bank of the Rapahannock, nearly opposite Fredericksburg. Mary (Ball) W. died 1789, the year of W.'s installation as first pres. of the United States.

W.'s school education was very meagre, comprising simply the elements—reading, writing, arithmetic; but by his diligent application he mastered so much of mathematics as was requisite for a land-surveyor. When he was 14 years old, his half-bro. Capt. Lawrence W. procured for him a midshipman's commission in the royal navy; but his mother opposed his entering the naval service, and W. continued his private studies at the home of Lawrence, Mt. Vernon, on the Potomac. He began to practice as a surveyor, and at 16 years of age was employed by Lord Fairfax as surveyor of his vast estates in Va. Thus he passed 3 years on the n.w. frontier of Va., leading the life of a pioneer in a region peopled (if peopled at all) only by the aboriginals: the mountains and valleys amid which he lived then were shortly afterward the theatre of the French and Indian war, in which W. rendered his first military service. When trouble with the Indians and French seemed imminent, 1751, W., then 19 years old, was appointed adjutant of the Va. forces, with the rank of maj. His bro. Lawrence died 1752, leaving a large fortune to an infant daughter, who did not long survive him: W. then succeeded to the estate under Lawrence's will. Gov. Dinwiddie, on arriving in Va., reorganized the military establishment of the province, which was divided into 4 districts, of which one was put under the command of W., then 21 years old. He went as special envoy from Gov. Dinwiddie, 1753, to remonstrate with the French commandant on the Monongahela against the efforts of the French and Indians to break up the settlements of the Ohio Co. of Va. in the w.: his report to the gov. of Va. showed that the French were fixed in the determination to check the westward movement of the English colonists. Measures were therefore taken by Dinwiddie to prepare for the inevitable struggle. A battalion of 300 men was raised to assert the rights of the colonists in the w. territory. W. declined the chief command, but became lieut.col. under Col. Joshua Fry. While on the march to the Ohio river the battalion halted at Will's Creek, Md., and intelligence was received there that a party previously sent forward to erect a fort at the confluence of the Monongahela and Allegheny rivers had been routed by French and Indians (1754, Apr. 7). This was the first act in the

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French and Indian war, which lasted 9 years (see FRENCH WAR). W. with 150 men was ordered to advance on the fort which the French had constructed there, Fort Duquesne; but his force was totally inadequate; and promised reinforcements failing, he did not attack the place. Through the death of Fry, W. now became chief commander. He repulsed the attack of a far superior force, French and Indian; and intrenched himself at Fort Necessity in the Great Meadows. Here he was compelled to capitulate to the French (1754, July 4), surrendering his artillery. He was permitted to return with his command to Va. W. resigned his commission the next year, and retired to his estate of Mt. Vernon. The following spring, 1755, a new campaign was organized against the French on the Ohio. The nucleus of the expeditionary force was two regts. of British regulars, and the commander-in-chief was Gen. Edward Braddock (q.v.). W. was chosen by Braddock as aide-de-camp. The campaign ended in disaster. The commander and all the chief officers were killed—W. saving the remnant of the army (1775, July 9). The Va. assembly now ordered the raising of a regt. for defense, and named W. chief commander. W. tried to win the co-operation of Gen. Lord Loudon, commander of all the royal forces in America, for an active campaign against the French and Indians; he tried also to obtain aid from the govts. of Penn., Md., and N. C. But no assistance was rendered; and on W., in command of an absurdly small force, was devolved the defense of a frontier-line of 400 m. The next year, however, a small British force, supported by a Va. battalion under W.'s command, made an expedition to Fort Duquesne; and W., who led the advance, took possession of the ruins of the fort (1758, Nov. 25), which had been abandoned by the enemy: Fort Duquesne now was called Fort Pitt, and there W. left as garrison 200 of his Virginians. Returning to Va., W. resigned his commission and took his seat in the Va. assembly, of which he had been elected member. He married, 1759, Jan. 17, Martha (Dandridge) Custis, a wealthy widow; and during the succeeding 15 years lived on his Mt. Vernon estate, managing its affairs with the exact methods of a man of business. His marriage was without issue. He continued a member of the assembly, attending its sessions in the winter.

The discontent of the colonies with the methods of the British govt. was becoming more and more pronounced, and at the instance of Va. a conference of representatives of all the colonies was called, to be held in Philadelphia 1774, Sep. 5. W. was a delegate to this congress, which recommended the assembling of another congress in the following spring. But before the second congress came together blood had been shed in collisions between colonists and the royal troops at Concord and at Lexington, Mass. (see these titles). The congress met 1775, May 10, and chose W. commander-in-chief of the military forces of all the colonies. W. accepted the commission, but declined all money compensation, stipulating only that moneys actually expended by him should be refunded. A year later

he wrote: 'When I took command of the army, I abhorred the idea of independence, but I am now fully satisfied that nothing else will save us.' His history from that day till the end of the war is the history of the United States (q.v.) for that period. From Philadelphia, where the congress sat (of which W. was a member), he repaired forthwith to Boston, and made his headquarters at Cambridge. The forces of the colonies in the vicinity of Boston numbered 17,000 men, of whom 14,500 were reported as fit for duty—raw levies, ill armed, ill clad, ill provided in every way. But W. laid siege to Boston with this army, and the British troops evacuated the town 1776, Mar. 17. A portion of the army around Boston was now ordered to New York, and by Aug. W. had gathered a force of 20,000 men, including sick, furloughed, etc., with which to confront the British force of 24,000 regulars, backed by a fleet. The American army was defeated in the battle of Long Island (q.v.), and W. made a skilful retreat toward Philadelphia, through New Jersey. His movements on the Delaware (see UNITED STATES—*History*) were pronounced by Frederick the Great 'the most brilliant achievements recorded in military annals.' It is simple truth to say that to the indomitable spirit of W. is in large measure due the fortitude and constancy of the army in enduring hardship at Monmouth (q.v.), Brandywine, and Valley Forge. The victory at Yorktown (q.v.) 1781, Oct. 19, was the last great act of his military career. After peace had been established, W., appearing in person before congress, assembled at Annapolis, Md., gave back (1783, Dec. 23) into the hands of the representatives of the people the commission by which they had appointed him commander-in-chief 1775, June 19. 'Having now finished,' said he, 'the work assigned me, I retire from the great theatre of action; and bidding an affectionate farewell to this august body, under whose orders I have long acted, I here offer my commission, and take my leave of all the employments of public life.'

W. then turned his face toward Mt. Vernon, purposing, there is no doubt, there to resume the duties of a private citizen and a planter. He owned much land in the country now comprised within the limits of W. Va., O., and Penn.; and soon after his return home made a tour of nearly 700 m. on horseback, through the unbroken wilderness, to visit his possessions on the Kanawha and the Ohio. But W. was needed in the counsels of the country, and he found himself constrained to re-enter public life. The original constitution of the United States, known as the Articles of Confederation, was found to be a weak and inefficient bond of union (see CONFEDERATION OF THE THIRTEEN AMERICAN COLONIES). The several units of the confederation were jealous of each other: what one wanted another would on no account tolerate; congress was a legislative body only in name: its acts were little better than waste paper. W. was painfully conscious of this fatal weakness of the central govt. He wrote: 'We are either a united people under one head and for federal purposes,

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or we are 13 independent sovereignties eternally counter-acting each other.' 'Shays's rebellion' in Mass. caused him great disquiet, as showing the inevitable outcome of the governmental anarchy. He wrote to Madison, 1786, Nov. 6: 'No morn ever dawned more favorably than ours did, and no day was ever more clouded than the present. . . . We are fast verging to anarchy and confusion.' The stern necessity of the time overcame his reluctance to enter public life once more; and he consented to be one of the delegates from Va. to the convention in Philadelphia 1787, May 14, to form a new constitution. In the convention his voice was for whatever provisions might tend to consolidate the Union, 'in which is involved our felicity, safety, and perhaps our national existence.' He was elected pres. of the United States under the constitution 1789, Apr. 6. He set out from Mt. Vernon for New York, then the seat of govt., Apr. 16, 'reluctant,' as he said, 'in the evening of life to exchange a peaceful abode for an ocean of difficulties.' On the way he was received with fitting honor and respect in every town through which his route lay. Apr. 30, on a portico in front of the hall then used as a temporary abode of congress, he took the oath of office and was formally installed. The U. S. sub-treasury building in Wall st. now (1892) occupies the site, and the momentous event is commemorated by a bronze statue of Washington erected above the spot where the ceremony took place.

Again W.'s history is the history of his country. In the presidential office he was a peacemaker between conflicting tendencies, warring factions, and irreconcilable interests. A contemporary observer, William Maclay, senator from Penn. in the first congress under the new constitution, wrote: 'The president's amiable deportment smooths and sweetens everything.' And the French minister Moustier, writing to his official superiors, said, a few weeks after W. had assumed the duties of office: 'The opinion of Gen. W. was of such weight that it alone contributed more than any other measure to cause the present constitution to be adopted. The extreme confidence in his patriotism, his integrity, and his intelligence, forms to-day its principal support.' He adds: 'All is hushed in presence of the trust of the people in the savior of the country.' The same perplexity that has worried his successors in the presidency beset W.: he experienced the annoyance attending the distribution of govt. places. A few weeks after induction into office he writes: 'No part of my duty will be more delicate, and in many instances more displeasing, than that of nominating and appointing persons to office. . . . I shall, however, in all events, have the satisfaction to reflect that I entered upon my administration unconfined by a single engagement, uninfluenced by any ties of blood or friendship, and with the best and fullest determination to nominate to office those persons only who . . . were the most deserving, and who would probably execute their functions to the interest and credit of the American Union.' He named as sec. of state Thomas Jefferson, whose politi-

cal principles were those of the opposite school from his own; his sec. of the treasury, Alexander Hamilton, was more in sympathy with his own views and his own interpretation of the constitution. The naming of Jefferson was patent proof that W.'s purpose was to administer the govt. purely for the good of the whole people and not in the interest of a political party or faction. The love of the people for 'the father of his country' was strikingly shown when, in the first summer of his official life, he made a tour through the e. states for his health, which had been impaired by a serious illness of some weeks. Everywhere the popular enthusiasm was unbounded; and it was genuine and spontaneous. The people held him in veneration as a character raised high above the meannesses of the common level of man's life; and it is no wonder that after his death he received the glorification by which good and great men, who have shown their qualities in days of fearful crisis, become idealized in the popular mind, and are portrayed by fond chroniclers as more than human. Thus did a plentiful crop of myth spring up around the name of W. even while he lived; after his death it still grew, till historic criticism was fain to use the scythe perhaps ruthlessly.

In W.'s two administrations there was in the United States no openly recognized division of parties; but two parties existed nevertheless: the party of centralization, of liberal constitutional construction, and (as their opponents maintained) of monarchical or aristocratic tendency. Alexander Hamilton represented that party or school in the cabinet: with him W. was, as already said, on the whole in sympathy. W. had felt deeply the evils of disunion, which had well nigh caused even him to 'despair of the state': thus there was good reason for him to favor such construction of the constitution as would lead to repression of the evils. Jefferson represented the other party or school, that of state right and strict interpretation of the federal constitution, so as to reduce to minimum the power of the central govt. When W.'s first term of the presidency was nearing its end, he desired to go back to his estate. But Jefferson wrote him: 'The confidence of the whole country is centred in you . . . North and South will hang together if they have you to hang on'—impressive testimony from a keen political opponent (for such was Jefferson). Hamilton wrote to exactly the same effect: 'It is clear that if you continue in office nothing materially mischievous is to be apprehended; if you quit, much is to be dreaded.' So, having been chosen by unanimous vote of the electors, W. entered on the duties of a second term 1793, Mar. 4. His first act awakened the slumbering partizanships. France, having declared war against England and Holland, expected aid, covert at least, from America. But Pres. W. issued, Apr. 22, a proclamation of neutrality. In this act he was supported by Hamilton and by the whole school of centralizers (including all well affected toward England and ill affected toward France and French ideas); but was opposed by the state-right fac-

tion (including the friends of France and of universal republican liberty). Before long the two schools stood confessed as political parties, one (with Washington) called federal, the other (with Jefferson) republican. A treaty with England, negotiated by John Jay 1794, further stimulated party division. A federal tax on whisky was the cause of much dissatisfaction, and 1794 there was a 'whisky rebellion' in w. Penn., which the pres. set out to suppress in person with a military force; but the revolt subsided on the intelligence of his approach, and W. was saved the necessity of taking up arms against fellow-citizens. The dismissal of Genet, French minister to the United States, also was made matter of recrimination between partizans.

W. at the end of his second term went to Mt. Vernon, there, as he hoped, to spend the remainder of his life. He bade farewell to congress and his countrymen in an address published several months before his actual retirement. But congress having, in the prospect of a war with France, authorized the levy of an armed force, Pres. Adams, in sympathy with the universal popular sentiment, called W. again into the service of the country. 'We must have your name,' he wrote to W., 'if you will permit us to use it. There will be more efficacy in it than in many an army.' So W. was, 1798, July 3, commissioned 'lieut.-gen. and commander-in-chief of all the armies raised or to be raised in the United States,' and at once set about the work of organization. War with France was averted, but before that happy consummation W. died. The immediate cause of death was lung congestion, brought on by exposure to a rain-storm while riding over his estate with his stewards. The date of death was 1799, Dec. 14, between 10 and 11 o'clock at night. The funeral ceremony was severely simple. His body was laid in a vault at Mt. Vernon Dec. 18, with Masonic rites, in presence of a small gathering of neighbors and a few soldiers. His eulogy was pronounced in congress by Representative John Marshall of Va., afterward chief-justice of the U. S. supreme court. The resolutions expressing the mind of the national legislature on the death of W. were drafted by Richard Henry Lee, and concluded with declaring that the deceased had been 'first in war, first in peace, and first in the hearts of his fellow-citizens': afterward Gen. Lee, in his panegyric of W., changed the last words 'fellow-citizens' to 'countrymen.' By resolution of congress the next succeeding anniversary of W.'s birth, Feb. 22, was commended to the whole people as a day to be devoted to commemoration of the deceased 'father of his country.' His writings were edited and pub. by Jared Sparks, 1834-37, 12 vols. (including a *Life* by Sparks). That ed. did not contain all of W.'s writings. A complete ed. of *The Writings of Washington, collated and edited by Worthington Chauncey Ford*, designed to be comprised in 14 vols., began to be pub. in New York 1888; the 12th vol. was issued 1892, Jan.—Judge Marshall pub. a *Life of W.* (5 vols. 1804). W.'s life by Washington Irving was pub. 1855-59, in 5

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vols.; it has been pub. in abridgment by John Fiske. W.'s life has been written in more compendious form by Mason L. Weems, David Ramsay, James K. Paulding, Charles W. Upham, Joel T. Headley, and many others.

WASHINGTON, MARTHA (DANDRIDGE): wife of Gen. George W.: 1732, May—1802, May 22; b. New Kent co., Va.; daughter of Col. John Dandridge. She received a good education at home; married Daniel Parke Custis 1749, who died 1757. Two children survived the father—viz., a daughter who died at the age of 17, and a son, John Parke Custis. The widow was married to Gen. George W. 1759. When Gen. W. was about to enter the military service of the colonies (1774), his wife wrote to a relative who censured the 'folly' of the step: 'I foresee consequences—dark days, domestic happiness suspended, and eternal separation on earth possible. But my mind is made up, my heart is in the cause. George is right; he is always right.' She was with W. at Cambridge 1775; she shared with the army the hardships of Valley Forge. During the war she would wear none but home-made fabrics for clothing. Her children by her former husband were adopted by Gen. W. An English traveller who visited Mt. Vernon, 1794, wrote: 'Mrs. Washington was extremely simple in dress.' She had strong dislike for public life and rejoiced when Gen. W. refused the offer of the presidency tendered to him the third time. Before her death she burned all her correspondence with Gen. Washington.

WASHINGTON, WILLIAM: soldier: 1752, Feb. 28—1810, Mar. 6; b. Stafford co., Va.; son of Bailey W., kinsman of Gen. George W. At the beginning of the war of the revolution he was studying for the Christian ministry; but was commissioned capt. of a Va. infantry regt., and served with the army around New York; was severely wounded in the battle of Long Island, yet at Trenton, 1776, Dec. 26, gallantly led a charge on an English battery, which he captured, but was again wounded. He was transferred to a cav. regt. 1778; served in the south in the army of Gen. Benjamin Lincoln 1779; while lieut.-col. commanding his regt. he defeated an English force under Lieut.col. Banastre Tarleton. He earned high distinction in the battle of Cowpens, where he had a personal encounter with Tarleton; his soldiership and gallantry were not less effectively displayed at Guilford Courthouse, N. C., Hobkirk's Hill, and Eutaw Springs: in the latter battle he was again wounded and was taken prisoner. He became a citizen of Charleston, S. C., after the war, and served in the state legislature; he declined a nomination to the governorship 'because he could not make a speech.'

WASHINGTON AND LEE UNIVERSITY: institution of learning at Lexington, Va. The legislature of Va. granted a charter (1782) to the Liberty Hall Academy, a school that had been in existence from 1749, and which, till the beginning of the revolution, had been named 'Augusta Acad.' To Liberty Hall Acad., George

WASHINGTONIA—WASHINGTON UNIVERSITY.

Washington gave 100 shares of the stock of the James River Canal Company, 1796, which the legislature purchased from the trustees, giving in return interest-bearing state bonds to the amount of \$50,000: the institution then became 'Washington College.' The Society of the Cincinnati endowed Washington College (1803) with a fund of \$25,000; and large bequests were made to it at sundry times till 1870, when, on the death of Gen. Robert E. Lee, the name was changed to Washington and Lee University. The polity of the university is in all essentials the same as that of the University of Va. (see VIRGINIA, UNIVERSITY OF), the several schools of arts, sciences, etc., being independent, and the students having free choice of studies. The govt. of the institution is in the hands of trustees. The Washington College was closed during the civil war, and its property was wasted and its buildings dilapidated; but the university has more than repaired the damages and losses. Gen. Robert E. Lee was pres. of the institution from 1865 till his death, 1870; then his son, Gen. George Washington Custis Lee, succeeded to the presidency. The univ. had (1902) 30 profs. and instructors, 270 students; of the professorships 7 were endowed; there was 1 fellowship and 20 scholarships. The annual charge per pupil for tuition was \$50; number of vols. in library 42,000; value of scientific apparatus \$16,400; value of grounds and buildings \$200,000; productive funds \$634,353, yielding \$34,500 inc.; total inc. from all sources \$47,000; pres. Geo. H. Denny, PH.D.

WASHINGTONIA: see SEQUOIA.

WASHINGTON UNIVERSITY: institution of learning in St. Louis, Mo., incorporated 1853. It is a state institution comprising several departments—viz., an Academy, Mary Institute, College; O'Fallon Polytechnic Institute, and a Law School. In the College the curriculum of studies is identical with that in other American colleges of liberal arts. The Mary Institute is a school of liberal arts for girls, with curriculum comprising the usual college branches. The O'Fallon Polytechnic Institute has five different courses in applied science—viz., civil engineering, mechanical engineering, chemistry, mining and metallurgy, and building and architecture: each of these courses occupies four years. The Academy is a high school for boys. The university also conducts a manual-training school, with 16 instructors and 500 pupils (1901). In the collegiate dept. of the univ. there were (1902) 24 professors and instructors, 151 students; scholarships 32; annual charge for tuition, \$150; vols. in library 13,000; value of scientific apparatus \$88,000, of grounds and buildings \$650,000. The total number of graduates in all depts. was (1902) 2,126. The Mary Institute had 16 professors and instructors, 440 pupils in all sections. The Law School had 16 professors and instructors, 127 students; tuition charge \$80 per year.

WASHITA—WASP.

WASHITA, *wăsh-ê-taw'*, RIVER: rising on the w. border of Ark., flowing e. and s.e. through La., emptying into the Red river, 30 m. from its mouth; it is 500 m. long, and is navigable to Camden, 300 m. Its chief branches are the Saline river, La Fourche, Tensas, and Little Missouri.

WASP, n. *wăsp* [AS. *wæps*; Ger. *wespe*; OHG. *wafsa*; L. *vespa*, a wasp; Lith. *wapsa*, a gadfly]: an active, stinging, winged insect, resembling a bee. **WASP'ISH**, a. *-ish*, resembling a wasp; quick to resent a trifling affront; snappish; irritable; slender in the waist, as a wasp. **WASP'ISHLY**, ad. *-ly*. **WASP'ISHNESS**, n. *-nēs*, the state or quality of being waspish; irascibility; snappishness. **WASPISH-HEADED**, in *OE.*, petulant. **WASP-FLY**, a striped fly resembling a wasp, but stingless.—**SYN.** of 'waspish': petulant; irascible; peevish; captious.

WASP: any species of the family *Vespariæ* and allied families, of the order *Hymenoptera*. They are distinguished from all the other *Hymenoptera* by their wings, when at rest, being folded throughout their entire length. The body is naked or slightly hairy. The general appearance sometimes resembles that of bees. The division between the thorax and abdomen is very deep, the abdomen often stalked. The legs are not fitted for collecting pollen, like those of bees. The females and neuters have stings, generally more formidable than those of bees. Wasps differ very widely in their habits; some being solitary, the family *Eumenidæ* of some entomologists; others social, to which the name *Vespidæ* is sometimes restricted. Neuters are found only among the social wasps. Some of the solitary wasps make curious burrows in sand, or construct tubes of earthy paste on the sides of walls, in which they form cells for their eggs, at the same time placing there a store of food for the larvæ, some of them using for this purpose perfect insects, others caterpillars, which are stung so as not to be killed, yet rendered incapable of motion. Others make little earthen cells on the stems of plants, and store in them a little honey for their young. The social wasps have various modes of constructing their nests, which are sometimes formed in excavations in the ground, sometimes attached to walls, boughs of trees, etc., and made of a paper-like substance, produced by mixing into a pulp, with their saliva, small particles of woody fibre, torn from trees, etc., by their broad and powerful mandibles. Great diversities are seen in arrangement of the combs within the nest. The combs are made of a substance similar to the outer covering of the nest, but generally thicker and firmer. As the nest is enlarged, new paper is made for the purpose, the whole nest being inclosed in the last-made envelope, and the inner ones, which sufficed for its former size, are removed to give place to combs. Several inner envelopes are generally found in a W.'s nest, so that paper-making must be a great part of the industry of these insects. The nests of the wasps of tropical countries are often very large, sometimes 6 ft. long, and the communities very numerous. In colder regions the increase of the community and

WASSAIL—WASTE.

of the nest is arrested by the approach of winter, when the males and the neuters die; but a few of the females survive, passing the winter in a torpid state in some retreat, and found new communities in spring. In a community of wasps there are many perfect females—not merely a single queen, as in the case of hive-bees. Wasps in their perfect state feed on a great variety of animal and vegetable substances—e.g., insects, flesh, fruit, sugar, etc. Grapes or gooseberries, especially if overripe, are often found to contain a W. in the interior. Wasps frequently invade bee-hives and steal honey. There is a Brazilian species (*Myropetera scutellaris*) which stores up honey like bees. Wasps may be killed by pouring hot water on their nests; but more easily by the vapor of burning sulphur, when the nests are not in the ground; or ether or chloroform may be used to stupefy the wasps, so that the nest may be safely destroyed.

There are about 900 known species. The genus *Vespa* is that of the Paper-wasps, though some build of other material. Our common and largest species is *V. maculata*. The yellow W. is *V. arenaria*. The Hornet (*V. crabro*) sometimes eats ripe fruit—its wages for using other insects to feed its young. *Polistes* hangs a few papery cells on bushes, with no inclosing wall. The most curious nests are the mud ones, often strung along on a currant-twig, made by *Eumenes fraterna*; they are globular, with a short neck and flaring mouth, and are pretty examples of insect pottery. There are other families often called wasps—e.g., *Crabronidæ*, the Sand-wasps and Wood-wasps—the forefeet of the females adapted to digging or tunnelling, sometimes in pith, in rotten wood, or enlarging nail-holes in posts. In the family *Sphegidæ*, some are large; such is the common gold-powdered rust-red *Sphex ichneumonea*, which digs holes in gravelly walks. In the family *Pompilidæ* there are 500 described species, often large, usually black or bluish black.

WASSAIL, or WASSEL, n. *wōs'sēl* [AS. salutation on pledging one to drink, *wæs-hæl*, be of health—from *wæs*, be, and *hæl*, whole or sound]: a custom formerly indulged in on Twelfth-night of going about with a great bowl of ale drinking healths; a drinking-bout; a festive occasion; any merry-making accompanied with drinking, particularly at Christmas; the liquor used on such festive occasions. WAS'SAIL, v. in *OE.*, to hold a merry drinking-meeting: ADJ. convivial; festive. WAS'SAILING, imp. WAS'SAILED, pp. *-sēld*. WAS'SAILER, n. *-ēr*, a reveller. WASSAIL-BOWL, WASSAIL-CUP, a large bowl or cup from which wassail was drunk.

WAST, v. *wōst* [see WAS]: 2d. person sing. of the past tense of the verb *be*.

WASTAGE: see under WASTE.

WASTE, v. *wāst* [OF. *gaster*, *waster*, to spoil, to render unfit for occupation: OHG. *wasten*, to lay waste; *waste*, waste, uncultivated land: Ger. *wüst*, waste, desert, desolate—all from L. *vastus*, waste, desert]: to cause or suffer to

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be lost by squandering; to destroy or expend wantonly or unnecessarily; to squander; to throw away; to wear out; to consume; to damage or injure; to desolate; to lose bulk or substance gradually; to be consumed or dissipated; to lose by lack of use: **ADJ.** ruined; ravaged; destroyed; uncultivated; desert; desolate; rejected, or used for inferior purposes; worthless; superfluous; exuberant; overabundant: **N.** land untilled; a region ruined, deserted, or desolate; a space unoccupied; the act of squandering; that which is rejected; refuse cotton or silk; useless expense; among *miners*, the old neglected workings of a coal mine. **WAST'ING**, *imp.*: **ADJ.** diminishing by dissipation; consuming by slow degrees. **WAST'ED**, *pp.* squandered; dissipated; diminished. **WAST'AGE**, *n.* -*āj*, waste or loss. **WASTE'FUL**, *a.* -*fūl*, expending without necessity or use; lavish; profuse; destructive; in *OE.*, desolate; uncultivated; unoccupied. **WASTE'FULLY**, *ad.* -*lī*. **WASTE'FULNESS**, *n.* -*nēs*, the act or practice of expending without necessity or use; prodigality; profuseness. **WASTE'NESS**, *n.* -*nēs*, a desolate state; solitude. **WAST'ER**, *n.* -*ēr*, one who wastes; a 'thief' on a candle. **LAIID WASTE**, made desolate; ruined. **WASTE-BASKET**, a basket or receptacle for discarded letters, papers, documents, etc.; a receptacle for waste material. **WASTE-BOOK**, a book in which rough entries of transactions are made; a day-book. **WASTE-PAPER**, spoiled paper or paper of no further use. **WASTE-PIPE**, a pipe for conveying away waste or superfluous water. **WASTE-STEAM-PIPE**, in *steam-engines*, the pipe leading from the safety-valve to the atmosphere. **TO RUN TO WASTE**, to become lost for any useful purpose.—**SYN.** of 'waste, *v.*': to dissipate; diminish; dwindle; desolate; squander; spend;—of 'waste, *n.*': prodigality; loss; diminution; destruction; dissipation; desolation; havoc; ravage; devastation; extravagance; profuseness.—*Waste*, in the law of real property, means the spoil or destruction to houses, gardens, trees, or other corporeal hereditaments, committed by tenants for life or for years, to the injury of the remainder-man or reversioner. Thus, he who has a life-estate, or an estate for years, in a house or land, cannot change the nature of things, as by turning arable into wood land or *vice versa*, though he may better a thing of the same kind, as by draining a meadow, etc. The characteristics of waste are to diminish the value of the inheritance, or to increase the burden on it, or to impair the evidence of title. Waste is either voluntary or permissive. The former consists in acts which the tenant has no authority to do—e.g., pulling down buildings, felling timber, or opening mines. Permissive waste arises from the omission of acts which it is the tenant's duty to do—e.g., suffering buildings to go to decay by wrongfully neglecting to repair them. There is, however, incident to every estate for life or years the right to take estovers—that is, so much wood, stone, etc., as is required for use on the tenement, for repairs, husbandry, and like purposes. Sometimes a tenant for life or for years holds estate under an instrument 'without impeachment for waste': the effect of this clause is to enable

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the tenant to take timber, minerals, etc., severed by himself or others during the continuance of his estate. But even where the tenant holds without impeachment of waste, he is not entitled to cut down ornamental timber; and if he do so, a court of equity will restrain him by injunction. Wherever the tenant is committing acts of a character especially destructive to the estate, or, still more, acts of wanton or malicious mischief, the court holds that his legal power to commit waste is being used unconscientiously, and will restrain him.

WASTE LANDS: uncultivated and unprofitable tracts in populous and cultivated countries. The term waste lands is not employed with reference to land not reduced to cultivation in countries only partially settled. There is a large extent of waste lands even in the British Islands. Of the 77,800,000 acres which they contain, only about 47,000,000 are arable land and improved pasture; 2,000,000 acres are occupied with woods and plantations; 7,000,000 acres in Scotland consist of sheep-pasture, generally at considerable elevation, and little improved by art; 8,000,000 acres in Ireland are uninclosed pasture, generally quite unimproved; 3,000,000 acres are mountain and bog; and the remainder is unimproved and unproductive.

The improvement of waste lands is very much a question of expense. It is often more profitable to improve lands already cultivated, and to bring them into a higher state of productiveness, than to reclaim waste lands.

In the United States, much of the land now practically waste is in this condition merely because the time has not yet come for profitable development of its capacities. A large portion of the area which 40 years ago was known as the 'Great American Desert' has been brought under cultivation and is remarkably productive. With increase of population, and multiplication of railroads, much of the land in the west now lying idle will be converted into fertile fields. Many of the 'abandoned farms' in the eastern states, some of which have been injured by a bad system of tillage, also will be reclaimed. The methods of improvement of W. L. must be adapted to the special characteristics of the soils. Briefly they are as follows: Drainage for those which are wet, irrigation for arid lands, clearing of those encumbered with rocks or covered with bushes or with trees not valuable for timber, and the breaking up of those which have not been brought under the plow. The use of manures or fertilizers will be requisite, and the ordinary processes of cultivation.

WASTING PALSY: *Tabes Dorsalis* (q.v.).

WASTREL, *n.* *wāst'rĕl* [prov. Eng.: dim. from Eng. *waste*, which see]: any waste thing or substance; that which may be thrown away or rejected as useless or imperfect; a term applied to a child growing up in ignorance, or being trained up to crime; a street Arab. **WASTOREL**, OE. for **WASTREL**.

WAT, *n.* *wāt*: a Siamese term for a sacred place, within which are pagodas, monasteries, idols, tanks, etc.

WATCH.

WATCH, n. *wöch* [AS. *wæcce*, a watch; *wacan*, to wake: Ger. *wache*, watch, look-out: Icel. *vakta*, to observe: see also **WAKE**]: wakefulness; attendance without sleep; close observation; steady look-out; a person or persons keeping guard; a sentinel; a guard; a watchman or watchmen; the space of time allotted to a guard to keep watch; period of time; hour, especially of the night, which among the Jews, Greeks, and Romans, was divided into three parts called the first, middle, and morning *watches*. Later there were four watches, called *even*, *midnight*, *cock-crowing*, and *morning*, or *first watch*, *second watch*, etc.: on *shipboard*, the period of time during which one portion of the officers and crew are on duty and the other resting; these periods are seven in number and four hours in length except from 4 to 8 P.M., which is divided into two dog-watches, the object of which is to prevent the same men being always on duty at the same hours. The watches are called the *afternoon watch* (noon to 4 P.M.); *first dog-watch* (4 to 6 P.M.); *second dog-watch* (6 to 8 P.M.); *first night-watch* (8 P.M. to midnight); *middle watch* (midnight to 4 A.M.); *morning watch* (4 A.M. to 8 A.M.); and *forenoon watch* (from 8 A.M. till noon). The name is applied also to the men on duty during one of these periods, generally known as the captain's or *starboard watch*, in charge of the capt. and second officer, and the port or *larboard watch*, in charge of the first officer. Also, that by which watches are measured; a portable pocket time-piece (see below): **V.** to be awake; to be attentive; to look with attention or expectation; to keep guard; to attend; to lie in wait for; to observe attentively in order to detect or prevent; to be carefully observant; to attend on the sick during the night. **WATCHING**, imp; **WATCHED**, pp. *wöcht*. **WATCHER**, n. *-ér*, one who watches. one who sits up to watch all night. **WATCHFUL**, a. *-fûl*, vigilant; careful to observe; attentive. **WATCHFULLY**, ad. *-li*. **WATCHFULNESS**, n. *-nës*, vigilance; suspicious attention; careful and diligent observation; inability to sleep. **WATCH-BARREL**, the brass box in a watch containing the mainspring. **WATCH-CASE**, the outside covering of a watch. **WATCH-DOG**, a dog kept to guard premises or property. **WATCH-FIRE**, a fire lighted at night as a signal, or for the use of the watch or guard. **WATCH-GLASS**, the glass covering the face of a watch. **WATCH-GUARD**, a cord or chain to attach a watch to the person. **WATCH-LIGHT**, *formerly*, a candle with a rush wick to burn in the night. **WATCH-MAKER**, one who constructs timepieces for the pocket. **WATCH'MAN**, n. one who guards the streets of a city, town, or large building by night or by day; a sentinel. **WATCH-TOWER**, a tower on which a sentinel is placed to watch the approach of enemies. **WATCH'WORD**, n. a word or phrase given to sentinels, used as a signal to distinguish a friend from an enemy, or one who has a right to pass the guard; a pass-word; a principle of action. **ANCHOR WATCH**, one or two men detailed to look after a ship while at anchor. **BLACK WATCH**, the 42d regiment of Highlanders, so named from the dark color of their tartan. **DOG-WATCHES**, two short watches on board ship between 4 and 8 P.M. **TO KEEP WATCH AND WARD**, to watch by night

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and defend by day; hence to be vigilant night and day; to guard carefully.—**SYN.** of 'watchful': wakeful; cautious; observant; circumspect; heedful.

WATCH: small portable timepiece, which can be carried in any position without stopping. In construction the W. differs from a clock chiefly in obtaining its moving power from the elastic force of a coiled spring instead of from a weight, the movement being regulated, so as to be isochronous, by a Balance (q.v.) and balance-spring instead of a pendulum: see **HOROLOGY**. The going part of a watch consists of a train of wheels and pinions, kept in motion by a spring, called the mainspring; the last and fastest wheel of the train, the scape-wheel or balance-wheel, acting so as to keep in vibratory motion a balance whose movement again—which is made isochronous by the action of another spring called the balance-spring—regulates to a uniform rate the revolution of the scape-wheel, and consequently the motion of the rest of the train, and the uncoiling of the mainspring.

The mainspring is a thin ribbon of steel coiled in a barrel. The inner end of it is fixed to a strong spindle, the axis or *arbor* of the barrel, around which it is coiled, and the outer end is fixed to the inside of the barrel. By its tendency to uncoil itself, the spring sets the barrel in motion, and it produces as many revolutions of the barrel as it makes turns itself in unwinding (fig. 1). As its elastic force is greater when it is tightly coiled than when it has to some extent unwound itself, a piece of machinery, called a fusee, is sometimes employed to correct the variations in the force of the spring, and equalize the power exerted on the train. The fusee is a cone with a spiral groove, connected with the barrel which contains the mainspring by a chain, one end of which is fixed at the broadest part of the cone, and the other end to the barrel (fig. 2). The barrel moves the fusee by means of the chain, which, as it runs off the sides of the fusee, is

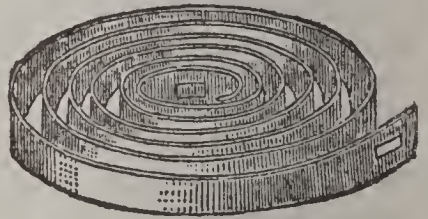


Fig. 1.

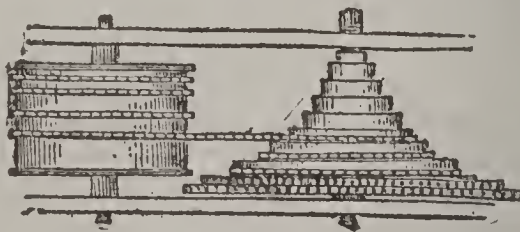


Fig. 2.

coiled on the outside of the barrel. In winding a watch the key is placed on the axis of the fusee, and by the same movement the mainspring is coiled around its spindle, and the chain wound off the barrel, to cover the cone of the fusee. So when the spring is all coiled up, and its force on the barrel is greatest, the chain is acting at the small

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end of the fusee, and its leverage on the fusee is least; as the force of the spring diminishes, the chain having come to a broader part of the fusee, the leverage is increased; and the grooving of the fusee being, when perfect, arranged so that a section of the fusee along its axis would present two hyperbolas placed back to back, secures that the force of the spring, modified by the leverage of the chain, shall produce a uniform motion of the fusee. From the fusee this motion is communicated to the watch-train, the first wheel of the train—called the fusee-wheel or the great wheel—being set upon the fusee. The fusee is introduced in almost all English-made watches; but a great proportion of watches made in the United States and Switzerland, and most French spring clocks, being made without fusee, have consequently no chain, and have the great wheel fixed on to the barrel. Accurate time-keeping was not formerly expected from such clocks or watches; but by skilful contrivance and careful construction in recent years, main-springs are now made to possess constancy of motion through the whole time of unwinding.

Between the train of wheels and pinions in a watch and that of a clock, until we come to the escapement, there is no difference, except that there is one more wheel and pinion in the watch-train than in the clock-train; the reason of which is, that the scape-wheel of a watch revolves, not like that of a clock, in a minute, but usually in about six seconds, making necessary an additional wheel to revolve in a minute and carry the seconds hand. A great variety of watch escapements are in use. The oldest is the vertical escapement. It corresponds exactly to the crown-wheel escapement in clocks (see HOROLOGY). The accompanying figure, showing a watch-train with this escapement, is useful as indicating, in a general way, the arrangement of the wheel-work in a watch (fig. 3). The mainspring contained in the barrel B sets in motion the

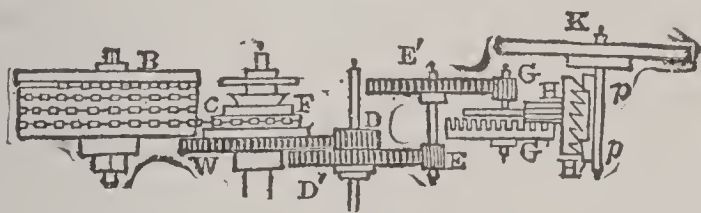


Fig. 3.

barrel, which, by means of the chain *c*, moves at a uniform rate the fusee *F*, together with which turns the fusee-wheel *W*, the first or great wheel of the watch-train. It is evident how, from the great wheel, motion is communicated successively to the centre-pinion *D*, and the centre-wheel *D'* (which turn in an hour); to the third-wheel pinion, *E*, and the third wheel, which is upon the same arbor, *E'*; and to the fourth or contrate-wheel pinion *G*, and the contrate-wheel *G'*. The upright teeth of the last-named wheel move the balance-wheel pinion *H*, and with it the balance-wheel or scape-wheel *H'*, which is fixed upon its arbor. The scape-wheel (and in this escapement the contrate-wheel also) is what is called, from its shape, a crown-

wheel. Upon the arbor or verge of the balance *K* are two pallets, *p, p*, at a distance from each other equal to the diameter of the scape-wheel, and so placed that, as the scape-wheel revolves, its teeth give them alternately an impulse in different directions, which keeps up the vibratory motion of the balance. The fusee is now not used on ordinary watches, the breaking of the chain and additional complications rendering it objectionable. The balance is made to vibrate isochronously by the action of the balance-spring; and its vibration regulates the escape of the teeth of the scape-wheel, and so the motion of the whole train, exactly as that of the pendulum does in an ordinary clock. The vertical escapement is liable, though in less degree, to the same objection as the old crown-wheel and the crutch or anchor escapements in clocks: there is a recoil of the scape-wheel after one of its teeth has been stopped by a pallet, which interferes more or less with the accuracy and uniformity of the motion of the train: see HOROLOGY.

Almost immediately after the invention of the balance-spring, attempts began to be made to introduce an escapement which would produce greater accuracy than the vertical escapement. Hooke, Huygens, Hautefeuille, and Tompion introduced new principles, each of which has since been successfully applied, though they all, from imperfect execution, failed at the time. The first real

improvement was made by George Graham, inventor of the dead escapement in clocks (fig. 4). This is called the horizontal escapement; it was introduced in the beginning of the 18th c., and it is still the escapement used in very many watches. The impulse

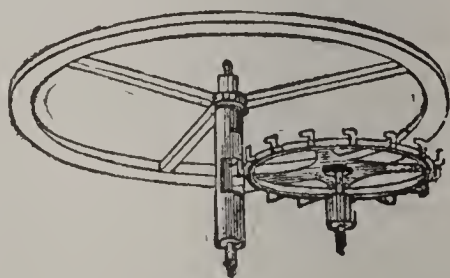


Fig. 4.

is given to a hollow cut in the cylindrical axis of the balance, by teeth of a peculiar form projecting from a horizontal crown-wheel. Other forms of escapement in high estimation are the lever escapement, invented by Berthoud, improved by Mudge; the duplex escapement, the principle invented by Hooke, the construction perfected by Tyrer; and the detached escapement of Berthoud, improved by Arnold and Earnshaw. The last-mentioned is employed in marine chronometers and in pocket-chronometers, as watches made in all respects like chronometers are called. The lever escapement is used in most English-made watches. In it the scape-wheel and pallets are exactly the same as in the dead escapement in clocks: see HOROLOGY. The pallets, *p, p* (fig. 5), are set on a lever which turns on their arbor, *A*; and there is a pin, *B*, in a small disk on the verge or arbor of the balance, which works into a notch at the end of the lever. The pin and notch are so adjusted, that when a tooth of the scape wheel has become free, the pin slips out of the notch, and the balance is detached from the lever during the remainder of its swing; whence

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the name *detached* lever escapement, originally applied to this arrangement. On the balance returning, the pin again enters the notch, moving the lever just enough to send the tooth next in order to escape from the dead face of the pallet on to the impulse face; then the scape-wheel acts on the lever and balance; the tooth escapes, and another tooth drops on the dead face of the pallet, the pin at the same time passing out of the

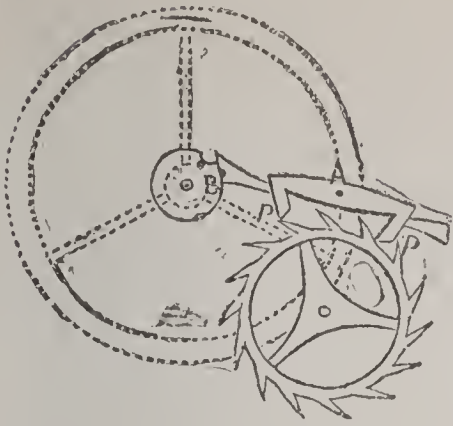


Fig. 5.

notch in the other direction, leaving the balance again free. This arrangement is found to give great accuracy and steadiness of performance. To prevent the teeth from slipping away while the balance is free, the faces of the pallets are slightly undercut, and this makes them secure while at rest; moreover, there is a pin on the lever which moves through a notch on the balance disk, while the pin, B, moves through the notch in the lever, which is so adjusted as to guard against the lever moving and the teeth escaping, while the balance is free.

In watches, even more than in clocks, variations of temperature, unless provided for, produce variations in the rate of going, the increase or diminution of the temperature affecting to some extent the moment of inertia of the balance, and to a great extent the elastic force of the balance-spring. A rise in the temperature makes the balance expand, and therefore augments its moment of inertia; it adds to the length of the spring, and thereby diminishes its elasticity, the elastic force of a spring varying inversely as the length; and the time of vibration of the balance, which depends on the moment of inertia directly, and on the elastic force of the spring inversely, is increased—the watch, that is, goes more slowly—in consequence both of the increase of the inertia and of the diminution of the elastic force of the spring. A fall in the temperature gives opposite results, the watch going more rapidly. A watch without a compensated balance would vary much more than a clock without a compensation pendulum, were it not that, being usually carried in the waistcoat pocket, it is kept at a fairly uniform temperature. To invent a satisfactory compensation was at one time the great problem for watchmakers. The compensation can obviously be made in one of two ways—by an expedient for shortening the effective length of the balance-spring as the temperature rises, so as to increase the elastic force of the spring; or by an expedient for diminishing the moment of inertia of the balance as the temperature rises, so as to correspond to the diminution of the force of the spring. The first method was that made use of by John Harrison (q.v.), who first succeeded in making a chronometer capable of measuring time accurately in different temperatures; but

an adaptation of the other method, invented by Earnshaw, in the beginning of the 19th c., is now employed (fig. 6):

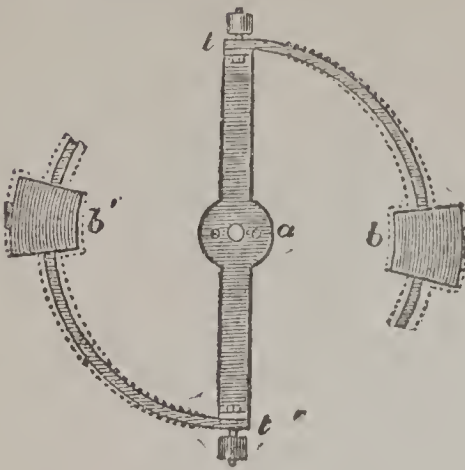


Fig. 6.

tat' is the main bar of the balance; and *tb*, *t'b'* are two compound bars, of which the outer part is of brass and the inner part of steel, carrying weights, *b*, *b'*, which may be screwed on at different places. The brass bar expands more with heat, and contracts more with cold than the steel bar; therefore, as the temperature rises, the bars, with

their weights, bend inward, and so the moment of inertia of the balance is diminished; as it falls, they bend outward, and the moment of inertia is increased; and of course the diminution or the increase must be made exactly to correspond to the diminution or increase in the force of the spring.

The chronometer is a large watch fitted with all the contrivances which experience has shown conducive to accurate time-keeping—e g., the cylindrical balance-spring, the detached escapement, and the compensation-balance. As a watch which will keep time in one position will often not do so equally well in another, marine chronometers are always set horizontally in a box in *Gimbals* (q.v.), an arrangement which keeps the chronometer horizontal, whatever the motion of the vessel.

The great importance of an accurate portable time-keeper at sea is for determining the Longitude (q.v.). This use was first distinctly pointed out by Sir Isaac Newton. In 1714 on the recommendation of a committee of the house of commons, of whom this philosopher formed one, a reward of £20,000 was offered by the Brit. government for the best means of finding the longitude especially by chronometers. The reward was finally awarded to John Harrison (q.v.).—Somewhat later, several excellent chronometers were produced in France by Berthoud and Le Roy, to the latter of whom was awarded the prize by the Académie Royale des Sciences. Progress was still made in England by Arnold, Earnshaw (inventor of the compensation still in use), and Mudge, to whom prizes were awarded by the Board of Longitude, and under whom a perfection nearly equal to that of the present day was obtained. The subsequent progress of watch-making has been directed chiefly to construction of pocket-watches on the principle of marine chronometers, or to the combination of accuracy with convenient portability. The adjusted lever watch is now made with a degree of accuracy which enables the performance to be warranted within an error of one second a day.

While the compensation of a chronometer can never be made perfectly accurate for all degrees of temperature,

there are always two temperatures at which a well-constructed chronometer will go with perfect accuracy. The explanation of this lies in the fact that while the variations of elastic force in the spring go on uniformly in proportion to the rise or fall of the temperature, the inertia of the balance cannot be made to vary as it should do, in exact correspondence to them inversely. The variation of the elastic force may be represented by a straight line inclined at some angle to a straight line divided into degrees of temperature; the corresponding changes of the moment of inertia will be represented by a curve, and this curve can coincide with the straight line representing the variations of elastic force only at two points, corresponding to two different temperatures. The particular points in the case of any chronometer are matter of adjustment. For instance, one chronometer may be made to go accurately in a temperature of 40° , and also in a temperature of 80° , at other temperatures being not so accurate; another chronometer to go accurately at a temperature of 20° and of 60° . It is manifest that the former would be adapted to voyages in a warmer, the latter to voyages in a colder, climate. Apparatus for testing chronometers has been long in use in some observatories. In a room isolated from noise and changes of temperature, the chronometers are arranged on a frame under a glass case, so contrived that they may be subjected in turn to any given degree of temperature. The rate of each under the different temperatures is observed and noted, and the chronometers registered accordingly. These observations are of great importance to ship-captains and to instrument-makers, who can have their instruments subjected to such observations on payment of a fee.

The mainspring had been employed as the moving force of time-keepers for about a century before the invention of the balance-spring; but very little is known about the action of these forerunners of the watch. A watch without a balance-spring must have been very rude and untrustworthy. The first proposal of the balance-spring was doubtless by Dr. Hooke; though Huygens and De Hautefeuille also invented it independently at about the same time.—See Denison's *Rudimentary Treatise on Clocks and Watches*; Wood's *Curiosities of Clocks and Watches*; Benson's *Time and Time-tellers* (1875).

Watch-making by Machinery.—The manufacture of watches by machinery has now acquired great importance in this country. In 1850 the art had its origin. A. L. Dennison and Edward Howard, of Boston, erected a watch factory at Roxbury, Mass., which establishment was removed 1854 to Waltham, Mass. The 'Waltham' watch has now attained a national and even a world-wide reputation: several years ago it had reached a production of about 350 movements a day, and was employing nearly 1,000 work-people. Every provision is made for the welfare of those employed, as in many parts of the manufacture a high degree of fidelity and skill is requisite. It is here mentioned

WATCH HILL.

as being the oldest of the watch-factories, and as typical of this class of establishments.

Every part of the watch is made in these works by machinery. This secures absolute similarity; thus interchangeability of parts is carried to its full extent. Every part is gauged, sometimes down to $\frac{1}{17000}$ part of an inch. A watch can be 'assembled' at random from the pieces as turned out in quantity. Some of the screws are so minute that it takes 150,000 to weigh a pound. By suppressing the fusee, chain, and main-wheel, the pieces were reduced in number from about 800 to 158. The old chain alone contained several hundred pieces. An isochronous balance of wide range has proved ample to secure extremely accurate time-keeping. A large amount of special machinery is employed, much of which with special tools has to be provided for every new design of watch made.—Other manufactories of watches by machinery have been established, and turn out excellent watches; notably one at Elgin, Ill., of immense extent and admirable product.

WATCH HILL: post-village in Westerly tp., Washington co., R. I., on the Atlantic Ocean, and about 3. m. s.e. of Stonington, Conn. It is near Watch Hill Point, a promontory forming the extreme s.w. point of R. I. The place has a fine beach and ranks next to Newport and Narragansett Pier, in R. I., as a popular summer resort.

WATER.

WATER, n. *waw'tér* [Dut. *water*; Ger. *wasser*; Gr. (*hudōr*, water: Icel. *vatr*; Sw. *wat*; Dan. *vaad*; L. *udus*, wet]: the fluid which descends from the clouds in rain; the liquid compound of oxygen and hydrogen which, when pure, is transparent, colorless, and destitute of taste or smell, and which is essential to the support of vegetable and animal life (see below): a body of this liquid whether standing or flowing; any liquid secretion resembling water; urine; the color or lustre of a diamond: V. to wet or overflow with water; to irrigate; to supply with water for drink; to diversify with wave-like lines, as silk; to shed liquid matter; to take in a supply of water; to dilute or weaken by the addition of water; hence *to water stock* is to reduce its value while increasing its bulk by the issue of new shares without any corresponding increase of actual capital. **WA'TERING**, imp.: N. the act of overflowing or sprinkling with water; the act of supplying with water for drink; the process of irrigating land; the process to which silk and other like fabrics are subjected to give them a wavy lustre and appearance. **WA'TERED**, pp. *-térd*: **ADJ.** supplied with water; overspread or sprinkled with water; made lustrous and wavy. **WA'TERER**, n. *-tér-ér*, that which or one who waters. **WA'TERY**, a. *-i*, thin or transparent as a liquid; tasteless; moist; abounding with water; pertaining to, or consisting of, water. **WA'TERINESS**, n. *-nēs*, state of abounding with water; moisture; thinness. **WA'TERISH**, a. *-ish*, thin as a liquid; somewhat watery. **WA'TERISHNESS**, n. *-nēs*, thinness; resemblance to water. **WATER-BAILIFF**, an officer in the customs for searching ships; one who watches a salmon-river to hinder poaching. **WATER-BEARER**, in *astron.*, the sign Aquarius (q.v.). **WATER-BRASH**, a hot sensation in the stomach, with the eructation of an acrid burning liquid that causes a distressing feeling in the parts over which it passes; also called *Pyrosis* (q.v.). **WATER-BUTT**, a large open-headed cask set up on end to contain rain-water. **WATER-CALTROPS**, an aquatic plant, the fruit of which is remarkable for the spines with which it is furnished; *Trapa natans*, the water-chestnut, also *T. bicor'nis*, ord. *Onagræcæ* (see **TRAPA**). **WATER-CARRIER**, a bearer or vendor of water. **WATER-CARRIAGE**, conveyance by water; means of transporting by water. **WATER-CART**, a cart carrying water either for sale, or for watering streets, etc. **WATER-CASKS**, vessels for holding water for a ship's use. **WATER-CLOSET**, a privy supplied with a flow of water from a cistern for the purpose of carrying off the discharges through a waste-pipe below. **WATER-COCK**, a tap for drawing water; a street-plug to supply water from mains. **WATER-COLORS**, in *paint.*, colors diluted and mixed with gum-water. **WATER-COURSE**, a channel for the conveyance of water. **WATER-CRANE**, a machine for supplying water to locomotive engines. **WATER-CRESS**; a small creeping plant growing in watery places, having an agreeable pungent flavor; the *Nastur'tium officinālē*, ord. *Crucifæræ* (see **CRESS**). **WATER-CURE**, a mode of treating diseases with water; Hydropathy (q.v.): **ADJ.** denoting an establishment where such treatment is employed; hydro-

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pathic. WATER-DOCK, a broad-leaved water-plant, *Rumex aquaticus*, ord. *Polygonacæ*. WATER-DOG, a dog which readily takes to the water; a sub-variety of the Poodle (q.v.), with head rather large and round, ears long, legs rather short, general form compact, hair long and curly but coarser and crisper than that of the poodle, 18 to 20 in. high at the shoulders, and much esteemed by wild-fowl shooters; *familiarly*, an old salt or sailor. WATER-DRESSING, lint or other soft material, saturated with water only, applied to sores, wounds, etc. WATERFALL, a fall of water over a sudden break or precipice, sometimes of great height; a cascade; a cataract (see below). WATER-FLAG, a species of iris; the sedge. WATER-FOWL, a fowl which lives much on water, and obtains its food chiefly from it. WATER-GAUGE, an instr. for measuring the depth or quantity of water. WATER-GLASS, a water-clock or Clepsydra (q.v.); a liquefied flint made by boiling silica in an alkali. WATER-GOD, a deity supposed to preside over water. WATER-HEN, a water-fowl. WATER-LEVEL, the level formed by the surface of still water. WATER-LINE, in *ship-building*, the horizontal line supposed to be described about a ship's bottom at the surface of the water, the line being higher or lower according to the depth of water necessary to float her. LIGHT WATER-LINE, the line round a ship's bottom where the surface of the water touches when the ship is unloaded. LOAD WATER-LINE, the depth to which a ship sinks when loaded, or the line where the surface-water comes into contact with the ship's bottom. WATER-LOGGED, a. lying like a log on the water, as a ship, when a large quantity of water has got into the hold. WATERMAN, a boatman; a ferryman; a water-carrier. WATER-MARK, the mark or limit of the rise of water; a letter or device wrought into paper during the process of manufacture by the pressure of wires on the wet pulp. The most ancient known watermark is found on a document dated 1351 (see PAPER). WATER-MEADOW, a meadow that can be inundated and thus fertilized. WATER-MELON, a plant whose fruit abounds with a sweetish liquor resembling water in color, and which contains a rich and delicious pulp; the *Cucur'bita citrullus*, ord. *Cucurbitacæ* (see MELON). WATER-METER, an instr. for registering the supply of water. WATER-MILL, a mill whose machinery is moved by water. WATER-NYMPH, in *anc. myth.*, a nymph presiding over, or frequenting, a particular piece of water; a naiad. WATER-PLANT, a plant found growing only in water. WATER-PLATE, a plate with a false bottom in which hot water can be stored, for the purpose of keeping the plate's contents warm. WATER-POWER, water employed to set and keep machinery in motion. WATER-POX, a popular term for the eruption of chicken-pox and the like. WATER-PROOF, a. so firm and close in texture as not to allow water to pass through; impervious to water: N. cloth rendered impervious to water; an overcoat, etc., made from such cloth: V. to render impervious to water. WATERPROOFING, n. any process or substance rendering leather or a textile fabric waterproof. WATER-RAT, a rodent animal frequenting streams, etc. (see VOLE). WATERSHED [see

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SHED 3]: the range of high land in any district of country which forms the source of its various streams and rivers, shedding them off as it were from the roof of a house to their respective basins. **WATER-SHIELD**, aquatic plant, now classed with the water-lilies (see **WATER-LILY**), in the family *Nymphæaceæ* (q.v.). The only known species grows in slow streams or ponds, from Canada to the Gulf of Mexico, and on the border of Puget Sound; also in Australia and e. India. **WATER-SNAKE**, a snake which lives in or frequents water. **WATER-SPOUT**, a remarkable phenomenon, often observed at sea, appearing as a great pillar of water reaching from the sea up to dense clouds above (see **WHIRL-WIND**). **WATER-SPRITE**, or **-WITCH**, a spirit supposed to frequent or live in water. **WATER-TABLE**, in *arch.*, a projection or set-off in the wall of a building to throw off water. **WATER-TABLES**, in a *ship*, the sills of the windows in the stern. **WATER-TIGHT**, a. so close and tight as to hold water without leakage, or keep it from entering. **WATERWAYS**, in a *ship*, pieces of wood around the ship at the junction of the deck with the sides, to prevent the entrance of water at the seam between them, and to strengthen both. **WATER-WEED**, a water-plant of recent introduction which has spread so rapidly as to have become almost universal; the *Anach'aris alsinas'trum*, ord. *Hy'drochar'idac'cæ* (see **ANACHARIS**). **WATER-WHEEL**, machine for raising water in large quantities; wheel moved by water, and employed to set machinery in motion (see **WATER-POWER**). **WATERWORKS**, works and machines for raising, retaining, and distributing water. **WATER-WORN**, a. smoothed and rounded by the action of water, as the pebbles in the bed of a river, or the gravel on the sea-shore. **WATERING-PLACE**, a place where water may be obtained for a ship, for cattle, etc.; a place to which people resort for drinking mineral water; a sea-bathing place. **WATERING-POT**, a nearly close pan or pail of tinned iron, and the like, with a long spout, terminating in a large, flat, or round hollow perforated disk (called a *rose*), used for watering plants, etc. **WATER OF CRYSTALLIZATION**, water which has combined chemically with a substance while passing from a state of solution to the solid crystalline form. **HARD WATER**, water largely impregnated with earthy or mineral ingredients. **SOFT WATER**, rain-water, or water nearly free from earthy ingredients (see **WATER SUPPLY**). **IN HOT WATER**, amid strife and contention; amid constant wearing care. **WATERED SILK**, silk with a shaded, wavy, or diversified surface, produced by moistening and pressure. **TO HOLD WATER**, to be tight; to be sound or correct; to be consistent with truth or reason. **TO MAKE WATER**, to pass urine; to admit water, as a leaky ship; to leak. **THE MOUTH WATERS**, the person longs; there is a vehement desire. **BLOOD THICKER THAN WATER**, phrase indicating that the natural ties of the family or national relationship will ultimately assert themselves in spite of trammels. **MINERAL WATER**: see under **MINERAL**.

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WATER (symb. H_2O , at. wt. 18, sp. gr. 1): liquid abundant in nature, the compound of oxygen and hydrogen, which in a state of purity, at the ordinary temperature of the air, is a clear, colorless,* transparent liquid, perfectly neutral in its reaction, and devoid of taste or smell. At a temperature below 32°F . it freezes, crystallizing in various forms derived from the rhombohedron and six-sided prism. See **ICE: SNOW: FUSING AND FREEZING POINTS: HEAT**. It appears from the researches of Arago and Fresnel, that notwithstanding the gradual dilatation of water below 39° , its refractive power on light continues to increase regularly, as though it contracted. Its density at 60°F ., and at the level of the sea, is taken at 1.000, and forms the standard of comparison for all solids and liquids, hydrogen being similarly taken as the standard of comparison for gases and vapors. Distilled W. is 815 times heavier than air; a cubic inch weighs, in air at 62° , with the barometer at 30 inches, 252.458 grains: and *in vacuo*, 252.722 grains; the grain being $\frac{1}{7000}$ of the avoirdupois pound: see **AVOIRDUPOIS: GALLON**. For all practical purposes, W. may be considered incompressible; but very accurate experiments have shown that it does yield to a slight extent under immense pressure; the diminution of volume for each atmosphere of pressure being about 51-millionths of the whole. W. evaporates at all temperatures; and under the ordinary pressure of the atmosphere, boils at 212° , passing off in steam, which, in its state of greatest density at 212° , compared with air at the same temperature, and with an equal elastic force, has a sp. gr. of 0.625. In this condition it may be represented as containing two volumes of hydrogen and one volume of oxygen condensed into two volumes. See **BOILING: STEAM: VAPOR**.

W. is the most universal solvent with which the chemist is acquainted; and its operations in this respect are equally apparent, though on very different scales, on the surface of the globe and in the laboratory. This solvent action is usually much increased by heat, so that a hot aqueous saturated solution deposits a portion of the dissolved matter on cooling. Some substances are so soluble in W. that they extract its vapor from the atmosphere, and dissolve themselves in it. Moreover, when W. is heated in a strong closed vessel to a temperature above the ordinary boiling-point, 212° , its solvent powers are much increased. Pieces of plate and crown glass, acted upon for four months by W. at 300° (in a steam-boiler), have been found reduced to a white mass of silica, destitute of alkali; while stalactites of siliceous matter, more than an inch in length, hung from the little wire cage which inclosed the glass—an experiment illustrating the action by which geyser springs

* Although water is colorless in small bulk, it is blue like the atmosphere when viewed in mass. This is seen in the deep ultramarine tint of the lakes of Switz rland and other Alpine countries, and in the rivers issuing from them; and in the water in the fissures and caverns of the glaciers, which, except on the surface, is extremely pure and transparent; and the deep blue tint of the ocean is due doubtless to the water itself, rather than to the salts dissolved in it.

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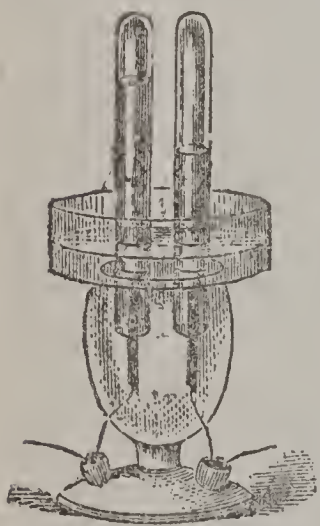
deposit siliceous sinter. All gases are soluble in W; but it dissolves very unequal quantities of different gases, and very unequal quantities of the same gas at different temperatures. Some gases are so extremely soluble in this fluid that it is necessary to collect them over mercury; e.g., at 32° , 1 volume of W. dissolves somewhat less than $\frac{2}{50}$ of its volume of hydrogen, and exactly $\frac{1}{50}$ of its volume of nitrogen, while it dissolves 506 and 1050 volumes of hydrochloric acid and ammonia gases; and while at 32° W. dissolves 1.8 times its volume of carbonic acid, it dissolves only half that volume of the gas at 60° .

W. enters into combination with acids, bases, and salts. When an acid has once been allowed to combine with W., the latter can seldom be entirely removed unless by intervention of a powerful base, which displaces the W., and allows its removal by heat. E.g., if sulphuric oxide or anhydrous sulphuric acid be largely diluted with W., and exposed to heat, watery vapor alone at first passes off; but as the temperature is raised to about 600° , a point is reached at which acid and W. distil over together. The liquid at this stage of concentration is found composed of one equivalent of acid and one of water ($\text{H}_2\text{O} \cdot \text{SO}_3 = \text{H}_2\text{SO}_4$). The further separation of the W. can be effected only by the addition of a base, as potash, oxide of lead, etc. W. which, as in this case, supplies the place of a base, is called *basic water*, and the compound is called a *hydrate*, or is said to be *hydrated*. Similarly, W. combines with strong bases, such as potash and soda, and heat can succeed only in reducing a mixture of potash and water to a condition represented by one equivalent of each ($\text{H}_2\text{O} + \text{K}_2\text{O} = 2\text{KHO}$); and this last equivalent of W. can be removed only by addition of an acid. In this case, the W. in combination with the base acts the part of an *acid*. These compounds also are *hydrates*. In these cases of acids and bases, the one equivalent of W. cannot be removed without completely altering the chemical character of the body (see, e.g., under SULPHURIC ACID, the difference between the properties of hydrated sulphuric acid and sulphuric oxide, or anhydrous sulphuric acid). In the case of many salts, however, a certain quantity of the W. entering, so to speak, loosely into their composition may be expelled by heat without altering the properties of the salt. The W. capable of being thus expelled is called *water of crystallization*, and is taken up by the salt in the act of crystallizing. The form of the salt depends on this water of crystallization. In chemical formulæ, this variety of W. is often represented by Aq instead of by H_2O : e.g., in the formula for ordinary phosphate of soda or hydrodisodic phosphate— $\text{Na}_2\text{HPO}_4 \cdot 12\text{Aq}$ —the 12Aq represents 12 equivalents of water of crystallization.

It is but little more than a century since the ancient view that W. was one of the four elements ceased to be believed. It is now known that it is a compound of oxygen with hydrogen in the proportion of one of oxygen to two of hydrogen. Hence its symbol is H_2O , and its combining number—18. When converted into vapor, its density as compared

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with atmospheric air (taken as unity) is 0.6235. That W. is such a compound as above stated may be proved either analytically or synthetically; and the subject is so important in the history of chemistry that we present these two modes of proof. The following simple mode of separating W. by voltaic electricity into its constituent elements is from Watts's *Manual of Chemistry*: 'When W. is acidulated so as to render it a conductor, and a portion interposed between a pair of platinum plates connected with the extremities of a voltaic apparatus of moderate power, decomposition of the liquid takes place in a very interesting manner; oxygen in a state of perfect purity is evolved from the W. in contact with the plate belonging to the copper end of the battery; and hydrogen, equally pure, is disengaged at the plate connected with the zinc extremity; the middle portions of the liquid remaining apparently unaltered. By placing small graduated jars over the platinum-plates the gases can be collected, and their quantities determined.



The figure shows the whole arrangement; the conducting-wires pass through the bottom of the glass cup and away to the battery. When this experiment has been continued a sufficient time, it will be found that the volume of the hydrogen is a *very* little above twice that of the oxygen; were it not for the circumstance of oxygen being sensibly more soluble in W. than hydrogen, the proportion of two to one by measure would come out exactly.'—W., as has been shown by Grove, is decomposed likewise by heat. This effect is produced by passing sparks from an induction coil through steam from W. kept boiling in a flask fitted with a tube for conveying the gases into a tube closed at one end, and with its mouth dipping into a mercury-bath. The two gases are obtained in very small quantities at a time.—The composition of W. may be proved synthetically by mixing oxygen and hydrogen (both as pure as possible) in the proportion 1:2, and passing the mixture into a strong glass tube standing over mercury, and exploded by the electric spark: all the mixture disappears as gases, and the mercury is forced up into the tube; above the column of mercury is found a quantity of W. answering to the amount of its gaseous constituents in the tube. The most satisfactory form of this synthetical proof, however, is afforded by reducing pure oxide of copper at a red heat by hydrogen, and collecting and weighing the W. thus formed. The apparatus required for this experiment is Cavendish's explosion-vessel or eudiometer.

Owing to its extremely solvent powers, the *pure water* which we have been hitherto considering is never found in nature. The nearest approach to a natural pure W. is *rain-water*, after a continuance of wet weather; but even this W. always contains in 100 volumes about 2.5 volumes

of atmospheric air, with a trace of ammonia; and in fact it seems impossible to obtain W. which does not contain this ingredient; for, after two distillations, Prof. Miller found from 1.85 to 2.38 volumes of air in 100 volumes of water. In addition to rain-water, the other *natural waters* may be included under the heads *Spring-water*, *Mineral Waters* (q.v.), *River-water* (see WATER-SUPPLY), and *Sea-water* (see below).

A prolonged and acrimonious controversy continued for many years, and is probably scarcely yet settled, regarding the claims of different philosophers to the discovery of the nature and composition of W. In 1781 Cavendish made a long and careful series of experiments, unfortunately not pub. till 1784, Jan., when his celebrated memoir entitled *Experiments on Air* was read to the Royal Soc. In the interval (1783, June) his friend, Dr. Blagden, visited Paris, and on the authority of Cavendish gave to Lavoisier an account of the experiments proving the composition of W.; and this delay between the discovery and the date of publication caused his claims to one of the most marvellous discoveries that the world ever saw to be contested by an English and a French rival, James Watt and Lavoisier. Cavendish's experiments consisted in exploding, in various proportions, mixtures of hydrogen and atmospheric air, and of hydrogen and oxygen, and finding as the result a liquid which proved to be pure water. (Priestley and his friend Warltire had made similar experiments, and had noticed the deposition of moisture that followed the explosion, but failed to recognize in it anything but the condensation of aqueous vapors in the gases.) The general conclusion to which Cavendish came was, in his own words, 'that W. consists of dephlogisticated air united with phlogiston,' and as dephlogisticated air was his term for oxygen, and phlogiston his term for hydrogen, this statement corresponds to the modern view of the nature of W. introduced by Lavoisier. As Lavoisier was from the first accused by the English chemists of having acted unfairly toward them, and as indeed his own claim dates back only to 1783, June 25, he may be dismissed from further consideration; and during the lives of the English claimants there were no public complaints on either side, though Watt, in private letters to his friends, hinted at Cavendish's incapacity and unfairness. Hence, then—at all events, in Britain—scientific men were startled when Arago, then sec. of the French Acad., pub. (1838) the *Eloge* of Watt, which he had read as early as 1834, Dec., in which he charged Cavendish with deceit and plagiarism, inasmuch as he was said to have learned the composition of water, not by experiments of his own, but by obtaining sight of a letter from Watt to Priestley. The battle now fairly began; the first blow being struck 1839, Aug., when the pres. of the Brit. Assoc., the Rev. Vernon Harcourt, in his opening address vindicated Cavendish, and pointed out Arago's misstatement. At a subsequent meeting of the Acad., Arago, with Dumas to back him, defended his statements. Sir David Brewster (*Edin. Rev.*, 1840, Jan.) then sought to act as mediator;

and the controversy, as might have been expected, went on with increased acrimony, and involved many distinguished men—among the last of whom were Sir David Brewster, in the *North British Review* (1847), and Lord Jeffrey, in the *Edinburgh Review* (1848), both advocating the claim of Watt. As we have no space to discuss Watt's real claims, we merely add that Dr. George Wilson, whose *Life of Cavendish* gives an impartial history of the water-controversy, maintains on very sound grounds that Watt was informed of Cavendish's discovery through Priestley, as Lavoisier was through Blagden.

Sea-water.—For accurate knowledge of the composition of sea-water, we are indebted mainly to the investigations of Prof. Forchhammer of Copenhagen. Not very many years ago, the only elements known to exist in sea-water, in addition to those constituting W. itself, were chlorine, iodine, bromine, sulphur, carbon, sodium, magnesium, potassium, calcium, and iron. To these 12 must now be added, (13) fluorine; (14) phosphorus, as phosphate of lime; (15) nitrogen, as ammonia; (16) silicon, as silica, in which form it is largely collected by sponges from sea-water; (17) boron, as boracic acid; (18) silver; (19) copper; (20) lead; (21) zinc; (22) cobalt; (23) nickel; (24) manganese; (25) aluminium, as alumina; (26) strontium, as strontia; (27) barium, as baryta; (28) arsenic; (29) gold; (30) lithium; (31) rubidium; (32) cæsium. But most of these elements exist in infinitesimal quantities. The substances which, in respect of quantity, play the principal part in the composition of sea-water are chlorine, sulphuric acid, sodium, potassium, calcium, and magnesium; those which occur in less but still determinable quantity, are silicon (as oxide), phosphoric acid, carbonic acid, and iron. In the elaborate tables annexed to Forchhammer's paper he has always calculated the single substances, viz., chlorine, sulphuric acid, and oxides of magnesium, calcium, and potassium (magnesia, lime, and potash), and the whole quantity of salt for 1000 parts of sea-water; but besides this, he has calculated the proportion between the different substances determined, referred to chlorine = 100, and of all the salts likewise referred to chlorine. This last number is found if we divide the sum of all the salts found in 1000 parts of any sea-water by the quantity of chlorine found in it; and he terms it the *coefficient* of that sample of sea-water. (The term *coefficient* will now doubtless be permanently retained by writers on the chemistry of sea-water.) This chemist divides the sea into 17 regions, his reasons being that he could thus avoid the prevailing influence which those parts of the ocean which are best known, and from which he has taken most observations, would exert on the calculations of the mean number for the whole ocean. In reference to the *salinity* of the surface of the ocean, he has made the following observations. (1.) The mean salinity of the Atlantic between 0° and 30° n. lat. is 36.169 (i.e., this is the quantity of salts in 1000 parts of water); the maximum, which is also the maximum of the surface-water of the whole Atlantic, being 37.908, and occurring in 24° 13' n. lat., and about 5°

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w. from the coast of Africa, where no rivers of any size carry water from the land, and where the influence of the dry and hot winds of the Sahara is prevalent. This maximum is equal to the mean salinity of the Mediterranean, and is exceeded only by the maximum of that sea off the Libyan Desert, and that of the Red Sea. The minimum is $34\cdot283$ in $4^{\circ} 10'$ s. lat., and $5^{\circ} 36'$ w. long., close to the coast of Africa, where the large masses of fresh water which the great rivers of that region pour into the ocean exercise their influence. (2.) In the Atlantic, between 30° n. lat. and a line drawn from the n. point of Scotland to the n. point of Newfoundland, the mean salinity is $35\cdot946$, the diminution being due to the fresh water poured into it by the s. mouth of the St. Lawrence. (3.) In the Baffin's Bay and Davis' Strait region, the mean salinity is $33\cdot281$, and the salinity increases from latitude 64° toward the n., being in 64° , $32\cdot926$, and in 69° , $33\cdot598$. This peculiarity is owing (says Forchhammer) to the powerful current from the Parry Islands, which through different sounds passes into Baffin's Bay, where it is mixed with the great quantity of fresh water that comes into the sea from the w. Greenland glaciers. (4.) From 11 observations on the Mediterranean between the Straits of Gibraltar and the Greek Archipelago, he confirms the old view of its great salinity; its mean salinity being $37\cdot936$, while that of the whole ocean is $34\cdot388$. Its maximum ($39\cdot257$) is between the island of Candia and the African shore; and its minimum ($36\cdot301$) is at the Straits of Gibraltar. These results are due to the influence of Africa and its hot and dry winds. In salinity, the Mediterranean is exceeded only by the Red Sea, whose mean salinity is $43\cdot067$. (5.) The Black Sea, like the Baltic, is a mixture of salt and fresh waters. In three different experiments, the salinity varied from $18\cdot146$ to $11\cdot880$. At a distance of 50 m. from the Bosphorus, the proportions between chlorine, sulphuric acid, lime, and magnesia were $100 : 11\cdot71 : 4\cdot22 : 12\cdot64$; while the normal oceanic proportions are $100 : 11\cdot89 : 2\cdot96 : 11\cdot07$; thus showing relative increase in the lime and magnesia. (6.) In the Caspian Sea the salinity varied between $56\cdot814$ and $6\cdot236$, and the proportion between the chlorine, sulphuric acid, lime, and magnesia is $100 : 44\cdot91 : 9\cdot34 : 21\cdot48$, which differs extremely from the normal proportion. (7.) The Atlantic between 30° s. lat. and a line from Cape Horn to the Cape of Good Hope, is less saline than the corresponding region n. of the equator; and all the samples from the w. part of this region have less, while the samples from the e. part, nearer the African coast, have considerably more sulphuric acid than the normal quantity. (8.) In the sea between Africa and the E. India Islands the mean salinity is $33\cdot868$. The minimum ($25\cdot879$) is from a place far up in the Bay of Bengal, and of course much influenced by the Ganges: it lies, however, about 300 m. from the mouth of that river; and another specimen from 60 m. nearer the mouth has a salinity of $32\cdot365$, so that it would seem as if some other cause (possibly fresh-water springs at the bottom) had been in operation to weaken the sea-water at the minimum spot.

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(9.) In the Patagonian cold-water current, the mean salinity was 33·966; while three samples brought from the S. Polar Sea, by Sir James Ross, had different salinities of 28·565, 15·598, and 37·513. Forchhammer cannot account for these discrepancies. All the specimens showed great excess of sulphuric acid (12·47 instead of 11·88, as compared with 100 of chlorine), a result due probably to the volcanic nature of the antarctic continent. Forchhammer's analyses of waters from other of his 17 districts call for no remark; we need cite only the general result, viz., that if we except the North Sea, the Kattegat, Sound, and Baltic, the Mediterranean and Black Sea, the Caribbean Sea and the Red Sea, which have all the characters of bays of the great ocean, the mean numbers are the following:

Sea-water.	Chlorine.	Sulphuric Acid.	Lime.	Magnesia.	All Salts.	Coefficient.
1000	18·999	2·258	0·556	2·096	34·404	1·812
	100	11·88	2·93	11·03		
Equivalents,	429	45	16	82		

Thus it is evident that the sea-water, in its totality, is as little a chemical compound as the atmospheric air; that it is composed of solutions of different chemical compounds; that it is neutral, because it everywhere in the atmosphere finds carbonic acid to neutralize its bases, and everywhere on its bottom and shores finds carbonate of lime to neutralize any prevailing strong acid; that lastly, the great stability of its composition depends on its enormous mass, and its constant motion, which occasions that any local variation is evanescent compared to the whole quantity of salt.

From these remarks on the *surface-water*, we pass to the difference of sea-water in *different depths*. On this subject, the result from the analyses of specimens of sea-water taken from different regions is so contradictory, that we merely quote the sentence with which Forchhammer begins this department of his subject: 'It would be natural to suppose that the quantity of salts in sea-water would increase with the depth, as it seems quite reasonable that the specific gravity of sea-water would cause such an arrangement. But this difference in specific gravity, relative to the increase in the quantity of salts, is counteracted by the decreasing temperature from the surface to the bottom. We have parts of the sea where the quantity of solid salts increases with the depth; in other parts, it decreases with the increasing depth; in other places, hardly any differences can be found between surface and depth; and lastly, I have found one instance where water of a certain depth contained more salt than both above and below. These differences are, to a great extent, dependent upon currents both on the surface and in different depths.' Sometimes, salinity of the surface-water is the same as that of the deep: or one or more ingredients may vary in its proportions.

How did the salts which now occur in the sea come into it? Is it the land that forms the sea, or is it the sea that makes the land? Are the salts that are now found in sea-water washed out of the land by the atmospheric water? Has the sea existed from the beginning of the earth? and has it slowly but continually given its elements to form

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the land? To these questions Forchhammer replies substantially as follows: Suppose a river had its outlet in a valley, with no communication with the sea; the valley would be filled with water till its surface was so great that the annual evaporation was equal to the annual supply. There would then be a physical but not a chemical equilibrium, because the annual loss would consist of pure water, while the received water would contain various mineral or saline matters, which would go on increasing till chemical changes would occasion precipitation of different salts. Now, in the water of the assumed river, we should find the bases prevailing in the following order—calcium, magnesium, sodium, iron, manganese, and potassium; while the acids, similarly arranged, were carbonic, sulphuric, muriatic (chlorine), and silicic. Now, all these substances are found in sea-water, though in very different proportions. The ocean is, in fact, such a lake as we have here supposed, with all the rivers carrying their dissolved matters into it. Why, then, our author asks, do we not observe a greater influence of the rivers? Why does not calcium, the prevailing base of river-water, occur in a greater proportion in the water of the ocean? In all river-water the number of equivalents of sulphuric acid is much smaller than that of calcium; yet we find in sea-water about three equivalents of sulphuric acid to one of calcium. There must thus be in sea-water a constantly acting cause that deprives it again of the calcium which the rivers furnish; and this cause we find in the shell-fishes, the corals, the bryozoa, and all the other animals which deposit carbonate of lime. These animals not only deprive the water of its carbonate of lime, but they likewise decompose the sulphate of lime—a decomposition probably depending on the carbonate of ammonia formed by the vital processes of these animals. The silica, always present in river-water, is appropriated by the varied sponges, diatoms, etc.; hence its scantiness in sea-water. With regard to the sulphuric acid conveyed into the sea, a small part enters into the composition of shells, corals, etc., and a greater part is attracted by sea-weeds, in which it undergoes reduction, as above described, while the rest remains in the sea-water. The magnesium of the river-water enters in small quantity into marine shells and corals; but only a small quantity is thus abstracted from sea-water, while the sodium and muriatic acid or chlorine form, as far as we know, by the pure chemical or organo-chemical action that takes place in the sea, no insoluble compound. Thus, he concludes, the quantity of the different elements in sea-water is proportional not to the quantity of elements which river-water pours into the sea, but inversely to the facility with which the elements in sea-water are made insoluble by general chemical or organo-chemical actions in the sea; and we may infer that the chemical composition of the water of the ocean in great part is owing to the influence which general and organo-chemical decomposition has on it, whatever may have been the composition of the primitive ocean.

WATER-BED—WATERBURY.

WATER-BED: rubber mattress filled with water, forming a soft cushion which obviates the inequalities of feather and other beds, and tends to prevent the formation of bed-sores. The water-bed devised by Dr. Arnott is described as a mattress floating on water, with a loose sheet of caoutchouc cloth properly secured between it and the water, to prevent its being wetted. See Arnott's *Elements of Physics* (6th ed.).

WATERBRASH: see PYROSIS.

WATER-BUDGET: heraldic bearing in the form of a yoke with two pouches of leather appended, originally intended to represent the bags used by the Crusaders to convey water across the desert, which were slung on a pole and carried across the shoulders.

WATER-BUG: one of a tribe or section of heteropterous insects, *Hydrocorisæ*, which live almost entirely in water, and feed on other aquatic insects. The anterior portion of the first pair of wings is horny; the antennæ are very small, and concealed beneath the eyes. The *Hydrocorisæ* are divided into two families, *Notonectidæ* and *Nepidæ*. Of the former, the Boat-fly (q.v.) is an example. The *Nepidæ* are popularly known as WATER-SCORPIONS, from the form of their forelegs. Some of the *Nepidæ* are powerful insects, two or three in. long.

WATERBURY, *waw'tēr-bēr-ĭ*: city in New Haven co., Conn.; on the Naugatuck river, and on the New York New Haven and Hartford, the New York and New England, and the Meriden Waterbury and Connecticut river railroads; 21 m. n.n.w. of New Haven, 33 m. s.w. of Hartford, 88 m. n.e. of New York. It is in a well-watered valley which provides abundant water-power for mechanical uses; is surrounded by hills; and is a marketing centre for a large territory. The city is tastefully laid out, well drained, lighted with gas and electricity, and supplied with water by one of the most costly and complete systems in New England. The principal streets radiate from a handsome public park, on the borders of which are the new city hall and St. John's Church (Prot. Episc.). There are 23 churches, pub. library, pub. hall, several hotels, high school, Acad. of Notre Dame (Rom. Cath. convent school), Waterbury Eng. and Classical School for Boys, St. Margaret's School for Girls (Prot. W.-.-.-), 4 nat. banks (cap. \$1,000,000), 3 sav. banks, 1 private bank, and 3 daily, 4 weekly, and 1 monthly periodicals. W. is noted for its manufactures of brass goods, producing annually about three-fifths of all the brass goods manufactured in the country. In 1900 the brass and copper industry was carried on with a capital of \$9,690,142, paid \$2,573,121 in wages, used materials that cost \$8,821,328, and yielded products valued at \$13,239,031. The manufactures comprise rolled and sheet brass, brass kettles, tubing, clocks, machinery, lamp-burners and trimmings, percussion-caps. pins, suspenders, buttons, and silver-plated ware. W. was settled 1667 as Mattatuck, and rec'd city charter 1853, Pop. (1880) 17,806; (1900) 45,859.

WATERBURY—WATER-COLOR PAINTING.

WATERBURY, DAVID: soldier: 1722, Feb. 12—1801, June 29; b. Stamford, Conn. He participated in the French and Indian war; was in the battle of Lake George 1755, and in the attack on Ticonderoga 1753; was with Montgomery at Quebec, as lieut.col. of the 9th Conn. regt., 1775; as brigadier he commanded at Skeensboro (Whitehall), N. Y., where a flotilla was building 1776 for service on Lake Champlain; and Oct. 11, while in command of a vessel in the action at Valcour Bay, was taken prisoner. He was charged with cowardice in striking his colors without firing a shot; but the charge was never made subject-matter of trial by court-martial; besides, W.'s commanding officer, Gen. Benedict Arnold, in reporting the engagement declared that W.'s ship was hit several times, in the hull. On being exchanged 1781, he received command of a brigade, and served in the field till the end of the war. He then went back to his farm, and represented his town, Stamford, in the state assembly repeatedly.

WATER-CHESTNUT: edible seed of the *Trapa natans* (see TRAPA), called in France *Marron d'Eau*. The name W.-C. is given also to the edible tubers of the *Scirpus tuberosus*, plant of nat. order *Cyperaceæ* (see BULRUSH: CYPERACEÆ), which is cultivated by the Chinese in tanks abundantly supplied with manure. It is destitute of leaves, except a slender short sheath or two at the base of each culm. It is stoloniferous, and the tubers are produced on the stolons. They are prized among the Chinese, both for food and as medicine, and are eaten either raw or boiled. They are called *shui-leih* (literally, 'water-chestnut'), *p'oh-tsi*, and *ma-ti* ('horse's hoof').

WATER-COLOR PAINTING: the most delicate of the graphic arts; artistic painting in which are employed pigments mixed with water instead of oil. It was in England first that it attained to the dignity of a recognized artistic pursuit, and came to be—what it now is—admittedly the rival of oil-painting in brilliancy and power. Of late years it has been practiced by eminent artists in various countries, as France, Germany and Austria, and the United States.

In the illumination of missals, water-colors were used mixed with the body white; and the same is true of the miniature-painting of the 18th c. Frescoes and painting in tempera also were in a sense works in water-color. But the art as now practiced had its origin in a different way. Dürer and some German, Flemish, and Dutch artists were accustomed to outline their drawings with a reed pen, and fill in those outlines with an auxiliary flat wash. Gradually the hard lines were replaced by touches with the brush, and the result was a monochrome in browns and grays, bistre or Indian ink. These, again, came to be tinted, and so suggested the full use of colors. Rembrandt often drew in brown, and added dashes of strong color; and Rubens produced something very like modern water-color drawings.

The modern art became emancipated from the old traditions by 'gradual disuse of the general shadow tint, and imitation of the local color, not alone of the objects them-

WATER-COLOR PAINTING.

selves, but of every modification resulting from light, dark, half-tint or distance, a method which at once led to far greater truth and richness than could ever have been attained by merely passing color over the universal shadow tint.' The stained drawing gradually gave way to the more perfect tinted drawing. But the tinted style predominated till 1790; and the water-colors of the 18th c. were tinted monochromes. Thomas Girtin and Joseph M. W. Turner (q.v.) showed what scope and power were in the art.

British artists who used the stained and tinted manner were Malton (1726-1801); Paul Sandby, R.A. (1725-1809), often termed, though without justification, 'the father of water-color art;' also (all in the last half of the 18th c.) Grimm, Webber, Clevely, Pars, and Rooker. Wheatley, Westall, and Gilpin used water-color as well as oil. Rowlandson, Cristall, Hills, Wright, Mortimer, Gresse, Hearne, J. R. Cozens, and Dayes greatly promoted the growing art. Nicholas Pocock (1749-1831) showed a new richness and force. John Smith (Warwick Smith) first escaped from the weakness of mere tinting. Thomas Girtin (1773-1802) attained great richness of tone and breadth; his compositions were grand but simple; he massed light and shade in broad and sometimes abrupt forms. J. M. W. Turner (1775-1851: see TURNER) soon distanced all his predecessors and contemporaries, and in his hands water-color painting became a new art. He wholly abandoned preliminary tinting; minute details are imitated in local color: his work is marked by breadth, fulness, warmth as well as grace. Other more or less important names are those of Delamotte, Varley, J. J. Chalon, A. E. Chalon, Samuel Prout, Peter de Wint, Liverseege, Cotman, David Cox (q.v.), Essex, Richardson, Newton, Copley Fielding, Robson, W. Hunt, Ross, Harding, Cattermole, Holland, Penley, Lewis, Houghton, Pinwell, and Henry Warren (q.v.): more recent are Birket Foster, Sir John Gilbert, Herkomer, etc.

At present, water-color paintings may be divided into three kinds: (1) those where the coloring is mainly transparent; (2) where it is usually opaque; (3) where transparent, semi-transparent, and opaque colors are freely used in combination. The quick drying of the water-color pigments is favorable to rapid execution; and greater clearness of color is attained than is practicable in oils. The progress of the art has been greatly promoted by modern chemistry developments in preparation of the colors—great variety of really permanent colors being now procurable. These are various pigments ground with gum or other mucilage, and may be kept in cakes, the usual vehicle for moistening and applying them being gum-arabic and water. But for artists they are now usually prepared so as to be kept moist in small earthenware pans or metallic tubes.

The Brit. Soc. of Painters in Water-colors was instituted 1804; it held its first exhibition 1805; and its annual exhibitions are now as crowded as those of the Royal Acad. Formal recognition of its dignity was accorded 1882, when the society obtained a charter, and became the Royal Soc-

WATER-COLORS—WATER-DROPWORT.

of Painters in Water-colors. There are other Brit. associations—e.g., the Institute of Painters in Water-colors. An admirable collection illustrative of the history of the art is in the South Kensington Museum.—The Amer. Water-color Soc. held its 23d annual exhibition (1890) in the New York Acad. of Design; exhibiting 645 works by such artists as Edwin A. Abbey, Hamilton Gibson, Henry Farrar, William Magrath, Thomas Moran, Walter Shirlaw, Bruce Crane, Ross Turner, Bolton Jones, W. T. Smedley. There is also an Amer. Soc. of Pastel Painters; it held its 4th annual exhibition (1890) in New York. Among the members were William M. Chase, Walter Palmer, Bolton Jones, Theodore Robinson, Rosina Emmet Sherwood.—See PAINTING—*Water-color Pictures*.

See Redgrave's *Introduction* to the Catalogue of Water-colors at South Kensington (1877); P. G. Hamerton's *Graphic Arts* (1882).

WA'TER-COLORS: painters' colors mixed with water and some adhesive material, as gum or size, instead of oil. Water-colors intended for drawings on paper are prepared with great care, and are usually formed into dry cakes, etc., with gum: four forms are in use—cakes, pastilles, pans, and tubes.—See WATER-COLOR PAINTING.—Those for coloring walls and scene-painting are roughly prepared with glue or size: these are often called Distemper Colors, from the Italian term *tempera*: see DISTEMPER. See PAINTING.

WA'TERCOURSE, in Law: any stream of water flowing naturally in a channel or bed: the term does not include the occasional courses of waters from a higher to a lower level, as after a heavy rain-storm or when heavy snows melt. In law a W. is comprised under the designation 'land;' hence a conveyance of land is conveyance of the streams passing through the land, as of the soil. When a W. is the boundary between estates or properties, the owners of the lands are called *riparian* proprietors. The property rights of riparian proprietors occupying lands on opposite sides of a stream extend on each side *ad medium filum aquæ* (to the central line of the stream). All the proprietors on the line of a W. possess precisely the same measure of rights in the W.; and none is permitted to make such use of the stream as to impair its equal use by all the rest, whether up-stream or down-stream.—In the United States a navigable river between two or more states is subject to the control of congress. The jurisdiction of navigable waters is not always determined by the *medium filum aquæ* when two separate state jurisdictions exist on the opposite banks.—See RIVER.

WA'TER-DROP'WORT: plant of the genus *Ænanthe*, nat. order *Umbelliferae*; having ovato-cylindrical fruit, not prickly nor beaked, each carpel with five blunt convex ribs, and single vittæ in the interstices; calyx teeth lanceolate; petals obcordate and radiant, with an inflected point; partial involucre of many rays; flowers of the circumference on long stalks and sterile, those of the centre subsessile and

WATEREE—WATERFALL.

fertile. A number of species, large perennial plants, with a strong and generally disagreeable aromatic smell and compound or decomposed leaves, are natives of Great Britain. The COMMON W. (*Æ. fistulosa*) and the HEMLOCK W., or WATER-HEMLOCK (*Æ. crocata*), are common in wet places throughout Europe, and both are narcotic acrid poisons. The roots of the latter have some resemblance to small parsnips; hence fatal results have often followed the mistaking one for the other.—The FINE-LEAVED W., called Water-fennel by the Germans (*Æ. phellandrium*, formerly known as *Phellandrium aquaticum*), also is common in ditches and ponds in Europe. It has a jointed root-stalk (*rhizome*), with tufted whorled fibres, and a strong zigzag stem dilated at the base. The leaves are decomposed. The fruit has a peculiar aromatic but disagreeable smell. It is not so poisonous as the species above named. It was formerly erroneously regarded as a specific against pulmonary consumption.—The Water-hemlock of the United States is of the genus *Oicuta*, the twin fruit subglobose; *O. maculata* has the stem 3–6 ft. high, streaked with purple, leaflets coarsely serrate, roots a deadly poison; *O. bulbifera* has linear leaflets, remotely toothed. The poisonous Water-parsnip, of which we have several species, is of the genus *Sium*. Poison-hemlock, with spotted stem, naturalized from Europe, is of still another genus, *Conium*.

WATEREE, *wōt-ēr-ē'*, RIVER: stream formed by junction of the Catawba and Fishing creek in N. C.; flowing s.e. into S. C., where it unites with the Congaree to form the Santee. Steamboats ascend the W. to Camden, 200 m. from the sea.

WATERFALL: a break in the continuity of slope of the channel of a river or stream, so abrupt that the body of water *falls* from the higher to the lower level. Waterfalls are most frequent in mountainous countries, where the streams from the mountain-sides enter the valleys. It is only when there is a shelf of hard rock that there can be a waterfall; in friable strata the stream wears out a ravine or side-valley. These mountain waterfalls, however, are generally rather curious and picturesque than grand, the volume of water being in most cases small, though the height of fall is occasionally very great. All mountain waterfalls necessarily change their aspect from season to season—in winter, a roaring torrent plunging headlong into the abyss; in summer, often a mere film of water trickling down the face of the precipice. Waterfalls in comparatively level districts often have a much greater volume of water, and some are among the grandest of nature's phenomena. It is where the course of a large river passes from a higher to a lower plateau, and where the upper plateau is edged with rock, that the grander cataraacts are formed. If the rocks are of the same hardness from top to bottom, the edge of the escarpment, supposing it to be perpendicular at first, becomes worn off, and a slope or *rapid* is formed. But when the upper edge is hard and the under-strata soft and friable, the reverberation of the spray wears away the softer parts below, leav-

WATER-FLEA—WATERFORD

ing a projecting ledge at the top, which breaks off, piece by piece, as it becomes too much undermined: thus the fall is constantly receding. This is illustrated on a large scale at Niagara, which, as it recedes beyond the soft strata, dipping southward, must eventually become all rapids, descending a slope of the limestone which now forms the shelf. For the rate of the recession see ANTHROPOLOGY. Some of the most remarkable waterfalls of the world are the Yosemite, Cal., a fall 2,550 ft., broken into three leaps; the Orco Falls at Monte Rosa, 2,400 ft.; Gavarnie (Pyrenees), 1,400 ft.; Staubbach (Switzerland), 1,000 ft.; Maanelvan (Norway), 940 ft.; Niagara (q.v.); Zambezi (q.v.); Missouri; the great Kaieteur fall in Brit. Demerara, more than 700 ft. The cataracts of the Velino and Anio, in Italy, are beautiful artificial imitations.

WATER-FLEA: a minute crustacean of the order *Cladocera*, family *Daphniadæ*, which skips about in the water like a flea. Water-fleas are abundant in pools and ditches everywhere. The W.-F. comes to the surface in the mornings and evenings, but keeps near the bottom during the heat of the day. It swims by taking short springs, whence its popular name. It feeds on minute particles of both animal and vegetable substances. It is a beautiful object for the microscope, the whole interior organization being visible through the transparent carapace. The male is much smaller than the female, and comparatively rare. The eggs, after leaving the ovary, are retained in a cavity between the body and the carapace, until the young have almost attained their perfect form.

WATERFORD, *waw'tér-férd*: maritime county of Ireland, province of Munster; bounded n. by the counties of Tipperary and Kilkenny, e. by Wexford, s. by the Atlantic, w. by the county of Cork; greatest length from e. to w. 52 m.; breadth n. to s. 28; 721 sq. m., or 461,563 acres, of which 325,345 are arable, 105,496 waste, 23,468 in plantations, 526 in towns, and 5,779 under water. The coast-line extends from the estuary of the Suir, Waterford Harbor, to that of the Blackwater at Youghal; and is partly flat, partly rocky, but in general very dangerous for shipping. The rocky district contains remarkable caverns. The surface is in general mountainous; the principal ranges being Knockmeledown, the Cummeragh, Monevolagh, and Drum. The Cummeragh Mts. are the loftiest, and abound in wild and picturesque scenery. The Suir (q.v.) and the Blackwater (q.v.) are the chief rivers. The climate is moist, and much of the soil is marshy; but the upland districts are well suited for tillage, and the lower pasture-lands, though inferior in fattening properties to those of the great central plain, produce excellent butter, which is largely exported. In geological structure the mountains present the old and new slate, separated by red and gray quartz rock and quartzose slate. Of quarry slate there are two principal varieties. The valleys belong to the limestone series, being an outlying prolongation of the great bed of the central plain. Lead, iron, and copper are found; and the copper-works have for many years been very productive. Marble of several colors and

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of considerable beauty is quarried, and potter's clay of good quality is found. The chief occupations are pasturage and dairy-farming; but there is considerable manufacture of cotton and linen at Portlaw, and the shipping-trade has become active and profitable. In 1881 there were 86,195 acres under crop, chiefly oats; and the live-stock comprised 12,522 horses, 97,839 cattle, 49,600 sheep, and 42,719 pigs. In 1880 there were 17,000 pupils in the national schools.

W. is divided into 8 baronies, 82 parishes, and 1,557 town-lands. The most considerable towns besides Waterford (q.v.) are Dungarvan, Carrick-beg, and Lismore. Clonmel, though chiefly in Tipperary, lies partly within this county. This dist., in common with the adjoining county Wexford, is believed to have been anciently peopled by a Belgic colony. The Danes also formed a settlement at the mouth of the Suir. From the date of the invasion, W. became a stronghold of the English, large grants having been made by Henry II. to the family of Le Poer; and in all the alternations of the subsequent struggle with the Irish population, it continued a firm centre of English influence. The county abounds with antiquities ecclesiastical and military, and of the Celtic and Danish as well as the Anglo-Norman period. Pop. (1881) 112,768; (1901) 87,187.

WATERFORD: city and parliamentary borough of Ireland, cap. of the county of W., but itself a county of a city; n. lat. $52^{\circ} 16'$, w. long. $7^{\circ} 8'$; on the river Suir, 12 m. from the sea; 97 m. s.s.w. from Dublin, with which it is connected by railways. The city, except an inconsiderable suburb (with which it is connected by a bridge of 39 arches, 852 ft. long, opening for the passage of ships), lies on the right bank of the Suir, along which a spacious quay extends nearly a mile, and from which the city ascends gradually in well-built streets. Vessels of 2,000 tons can discharge cargoes at the quay; but there is an anchorage for still larger ships about 6 m. lower down the river, at Passage. The chief public buildings are the Prot. and Rom. Cath. cathedrals, the Prot. Episc. palace, the (Rom. Cath.) College of St. John, the Model National School, and the city and county court-houses. There are various public institutions. The chief trade is with Great Britain in the export of butter, pork, bacon, corn, flour, eggs, and live-stock. Steam-navigation has received great impulse, and there is a ship-building yard, with patent slip, graving-bank, and dock, on the Kilkenny bank of the river. Eight newspapers are published in W.

W. was of Danish foundation; but at the invasion the city was taken by assault by Strongbow, by whom it was enlarged and made a place of strength. It received a charter from John, which was forfeited under James I., but restored by Charles I. 1626. But few remains of its ancient buildings are visible.—Pop. (1871) 29,979; (1881) 29,981; (1891) 20,852; (1901) 26,769.

WATER GAS—WATERLAND.

WA'TER GAS: see GAS, WATER.

WA'TER-GLASS: soluble silicates of potash or soda, or a mixture of both; usually prepared by boiling silica with caustic alkali under pressure, about 60 lbs. to the sq. in., in a digester. When pure and solid, W.-G. has the appearance of common glass, and is slowly soluble in boiling water. A solution of it is used, mixed with sand, etc., to form artificial stone (see STONE). It is also spread on the surface of stone to protect it from decay, as it sinks in and cements the particles together; and it enters into the composition of some kinds of cement. In the art of Stereochromy or Fresco (q.v.) painting. W.-G. is much used. It has become useful also in certain dyeing processes, having in some cases been found to answer the purpose of dunging.—See GLASS—*Soluble Glass*: FRESCO—*Stereochromic Painting*.

WA'TER-HEN: see GALLINULE.

WA'TERHOUSE, BENJAMIN, M.D.: physician and author: 1754, Mar. 4—1846, Oct. 2; b. Newport, R. I. He studied medicine in Newport, London, Edinburgh, and Leyden, graduating at Leyden 1780. In 1783 he helped to establish the Harvard Med. School, and 1783-1812 was prof. of medicine there; was also prof. of nat. hist. at Brown Univ. 1784-91, delivering at Providence the first course of lectures on that subject ever delivered in this country. In 1812 he resigned his professorship at Harvard, and from this time until 1825 was medical supervisor of military posts in New England. W. was an early advocate of vaccination. He published several medical works and a novel.

WATERLAND, *waw'tér-land*, DANIEL, D.D.: Anglican clergyman, prominent in the theological controversies of the first half of the 18th c.: 1683, Feb. 17—1740, Dec. 23; b. Waseley, in Lincolnshire, of which parish his father was the rector. After the usual course of study at Magdalen College, Cambridge, he became rector of Ellingham 1713. George I. appointed him one of his chaplains 1717. About this time he engaged in theological controversy with Dr. Whitby; and 1719 he expanded his writings on this subject into his *Defence of Christ's Divinity*, a work sharply criticised by Arian writers. W. replied in a work published 1724. In 1721 he was appointed rector of the parish of St. Augustine in the City of London; 1724 chancellor of the cathedral of York; a canon of Windsor 1727; archdeacon of Middlesex 1728. With these he held the valuable living of Twickenham. During these years he was indefatigable in controversy, against the Arians, and against freethinkers, such as Middleton and Tindal, and against those of the Anglican body who did not share his doctrines on the Trinity and the Eucharist. *A Critical History of the Athanasian Creed* (1724), *A Review of the Doctrine of the Eucharist* (1737), and *Scripture Vindicated* (1730), are noteworthy among his productions. A complete ed. of his works, with memoir of his life by Bp. Van Mildert, was pub. Oxford 1823, 10 vols. 8vo; vol. XI., 1828.

WATERLANDERS—WATERLOO.

WATERLANDERS, *waw'tér-länd-érz*: in *chh. hist.*, a name given to the less rigid portion of the Mennonites, because the majority of them belonged to a district called Waterland, in N. Holland. They are almost exactly similar in their principles to the English Baptists. They are sometimes called Johannites, from Han de Rys, one of their leaders in the 16th century.

WATER-LILY: any plant of the genera *Nymphaea*, *Nuphar*, and *Nelumbium*, all of the nat. order *Nymphaeaceæ* (q.v.); and often extended to all the plants of that order—e.g., the *Victoria regia*. Britain produces three species—*Nymphaea alba*, the White Water-lily; and *Nuphar luteum* and *Nuphar pumilum*, called Yellow Water-lilies. The two former are frequent in still waters; *Nuphar pumilum* is more rare, and is found chiefly in Scotland. All have heart-shaped leaves, floating on the water. The beautiful and fragrant white flowers of *Nymphaea alba* float upon the water; the flowers of the yellow water-lily, of little beauty, are raised by their stalks a little above it. The seeds of these, as well as of the Water-lily of the Nile (*Nymphaea lotus*: see **LOTUS**), are farinaceous, and are sometimes used for food. The Turks prepare a cooling drink from the stems of *Nuphar luteum*.—The SWEET-SCENTED WATER-LILY of N. America, *Nymphaea odorata*, has a large white flower of great beauty and of very sweet smell: the flower varies to pinkish (bright pink at Barnstable, Mass.), the leaves often crimson beneath. *N. tuberosa*, N. Y. to Ill. and s., is scentless or with faint apple odor, and has numerous self-detaching tubers. Of the Yellow Pond-lily (*Nuphar*) there are several species, larger and smaller. *Nelumbium* has a large top-shaped receptacle, in which the nut-like seeds are contained in open cavities: see **NELUMBO**.—Not only *Nymphaea lotus*, but also *N. rubra* and *N. pubescens* are regarded as sacred plants by the Hindus. *N. cærulea* also was held sacred by the ancient Egyptians.

WATERLOO, *waw-tér-ló'*: city, cap. of Black Hawk co., Io.; on the Cedar river, and on the Illinois Central, the Burlington Cedar Rapids and Northern, and the Chicago St. Paul and Kansas City railroads; 6 m. e.s.e. of Cedar Falls, 93 m. w. of Dubuque. It is in an agricultural region; exports grain, flour, live-stock, and agricultural implements; and by the excellent water-power afforded by the river carries on important manufactures. There are 15 churches, court-house, high-school, opera-house, 3 banks, and 2 daily, 2 weekly and 5 monthly newspapers. Pop. (1880) 5,630; (1890) 6,674; (1900) 12,580.

WATERLOO: town, cap. of Seneca co., N. Y.; on the Cayuga and Seneca canal, and on the New York Central and Hudson River railroad; 3 m. w. of Seneca Falls, 19 m. w. of Auburn. It contains 8 churches, handsome court-house, public hall, union school, 1 national bank (cap. \$100,000), 1 state bank (cap. \$25,000), and 2 weekly and 1 quarterly periodicals; and, with power from the Seneca outlet, manufactures, malt, woolen goods, flour, foundry and machine-shop products, and lumber in various forms. Pop. (1880) 3,893; (1890) 4,350; (1900) 4,256.

WATERLOO.

WATERLOO', BATTLE OF: decisive conflict which annihilated the power of Napoleon I., 1815, June 18, in a plain about 2 m. from the village of W., in Belgium, 12 m. s. of Brussels. The Allies having resolved to attack Napoleon on all sides, and crush him as they had done in 1814, Brit. and Prussian troops were stationed in the Netherlands, under Wellington and Blücher respectively, to attack France on the n. Napoleon, aware that for a considerable time no weighty attack could be made on France except by these forces, and recognizing the advantage of destroying one enemy before the others could come up, rapidly concentrated the bulk of his troops; and, with a suddenness and secrecy which defied all effective counter-preparations, crossed the Belgian frontier, and fell with a part of his forces on the Prussians at Ligny (q.v.), and with the other part, under Ney's immediate command, on the army of the Prince of Orange at Quatre-Bras (q.v.). The Prussians—as Wellington, after learning Blücher's dispositions for the battle, had foretold—were completely defeated, after a very obstinate contest; but the Prince of Orange, by the aid of the reinforcements promptly forwarded by Wellington, succeeded in withstanding Ney's attack. In the plan of the Allied generals such a result was not unforeseen, and in accordance with their scheme of firm resistance, and retreat if necessary (to allow time for the Russians and Austrians to assemble on the e. frontier of France), Blücher retreated n. (instead of e., as Napoleon expected), nearer the place of rendezvous with Wellington at Mont St. Jean; while early on the morning of the 17th the Anglo-Netherlanders retired along an almost parallel route till they reached the forest of Soignies, in front of which they were formed, facing s., in battle-array. Napoleon, imagining that the Prussians were in total route, and that their complete dispersion would easily be accomplished by Grouchy's division (33,000 men), which he had sent in pursuit, crossed to Quatre-Bras with the rest of his troops, and, uniting with Ney, marched in pursuit of Wellington, arriving on the plain of W. in the evening.

The two armies which then confronted each other, though nearly equal in strength, were composed of very different materials. The French army, numbering from 69,909 to 72,247 men (according to French authorities), was composed of veteran troops, who had enthusiastically ranked themselves once more under the standard of the chief who had so often led them to victory. The Anglo-Netherlands army, which numbered 69,894, of whom only 25,389 were British, 6,793 of the king's German legion, 10,995 Hanoverians, 6,303 Brunswickers, 2,926 Nassauers, and 17,488 Netherlanders, consisted, with the exception of a small number of Peninsular veterans, wholly of young soldiers, a large proportion of whom had never been under fire; the Hanoverians were only militia, some of them being fit for garrison-duty only; while the behavior of many of the Belgian troops during the battle showed plainly that they merely increased the *numerical* strength of the army

WATERLOO.

without adding to its fighting strength, as they left it to the Dutch soldiers to vindicate the wrongs of the Netherlands. The French had 240 guns, while their opponents had only about 156 guns. With such an army, to maintain even a defensive conflict with an army of veterans, commanded by the greatest general of the time, was a task which required all Wellington's rare tenacity of purpose to undertake; yet undertake it he did, depending on Blücher's promise to join him an hour after midday.

On the morning of the 18th the two armies found themselves ranged in battle-array: the Allies, posted on a line of eminences, had their left wing resting on Frischermont, the farm-house of La Haye Sainte in front of their centre, while their right wing curved convexly round behind Hougomont, and rested on Braine Merbes. The French were ranged on a parallel row of eminences, having La Belle Alliance in their centre, with some divisions of cavalry and infantry in reserve behind the right wing, Kellermann's dragoons behind the left wing; and the Guard, stationed with the 6th corps, in the rear. Skirmishing had continued all the morning; but the first serious attack was made between 11 and 12 A.M., when a part of the 1st corps advanced against Hougomont, with the view of masking the more important attack to be made against the Allied left. This preliminary assault, however, though unsuccessful, was maintained with great vigor for a considerable time; till Napoleon, dreading further loss of time, prepared to make his grand attack on the left centre. At this time (1:30 P.M.) he learned that the advanced guard of the 4th Prussian corps (Bülow's) was appearing in front of St. Lambert, 2-3 m. to his right; and being forced to detach his 6th corps (Lobau's) with the reserves of cavalry behind his right wing, to keep them in check, he had to modify his grand plan of attack, and ordered Ney to break through their centre. At 2 P.M., after a furious preliminary cannonade, from which Wellington sheltered his men (as at various other times during the battle) by retiring them to the reverse of the slope, Ney advanced against the left centre with 20,000 men, but had succeeded only in putting to flight a Belgian brigade when he was attacked and driven back by Picton's division, his retreating columns charged and broken by the Brit. cavalry, and 2,000 prisoners taken. Nevertheless Ney soon returned to the charge, and carried La Haye Sainte, though his repeated attacks on the infantry in position were constantly repulsed, and his retreating columns severely handled by the Brit. cavalry, who, disordered by success, were as often overthrown by the French cuirassiers. By this time (4:30 P.M.) Bülow had succeeded in deploying from the woods; and, advancing against Planchenoit, in the rear of the French right, carried it after a vigorous conflict. Lobau's corps, however, aided by a reinforcement from the Guard, speedily retook the post, and, driving the Prussians back into the wood, secured the French right flank for a time. Another Prussian corps (the 1st, under Ziethen) was coming up by Ohain to join the Allied left; but Napoleon was

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still confident that he could destroy the Anglo-Netherlanders before the Prussians could render effective aid. During the conflict with Bülow, Ney had been warmly engaged with the centre and right of the enemy, who had made various attempts to regain the wood of Hougomont and La Haye Sainte; and Ney had supported his repeated attacks with not only his own cavalry, but with the cuirassiers, lancers, and chasseurs of the Guard, and the whole of the mounted reserve, without, however, producing any result other than great slaughter on both sides, and the useless sacrifice of 18,000 of the finest cavalry ever seen. Napoleon now resolved on another vehement assault on the immovable British centre, and directed against it in succession two columns, one composed of four battalions of the Middle Guard, and the other of four battalions of the Middle and two of the Old Guard, supporting them with flank attacks of other infantry divisions, of cavalry, and with a dreadful fire of artillery. The advancing French were met with a well-sustained fire from every piece which could be brought to bear on them; the first attacking column was fairly driven down the slope by the Brit. Guards, and the second was totally routed by a bayonet-charge of Adams's brigade, the Brit. cavalry following up the fugitives. Ziethen had now (7 P.M.) joined the left of the Brit. line; Bülow, further reinforced, had carried Planchenoit, and was driving the French right wing before him; and the combined attack on the retiring masses of the French by the whole effective force of the Anglo-Netherlanders on the one side, and of the Prussian cavalry on the other, converted an ordinary though severe defeat into a rout unparalleled in history. The magnificent cavalry, uselessly destroyed by Ney in fruitless attacks on an 'impracticable' infantry, would then have been of incalculable service, but they were no longer to be had. The last square of the Guard still stood its ground, to protect the flight of the emperor; but it was speedily surrounded, and, on the soldier-like refusal of Cambronne to surrender, was in a moment pierced through and broken to pieces. From this time all resistance was over; the roads southward, especially that to Genappes, were crowded with fugitives fleeing for their lives from the pursuing cavalry; and though the Brit. light cavalry, exhausted with their severe work during the battle, soon ceased the pursuit, it was kept up with great energy through the whole night by Blücher's Prussian troopers, who had made their appearance on the field in time to complete the victory, and who seemed bent on at once avenging the defeats of Jena, Auerstadt, and Ligny. The total loss in this battle was, from the obstinacy and determination with which it was contested, necessarily large; the figures are: British and Hanoverians 11,678; Brunswickers 687; Nassauers 643; Netherlanders 3,178:—total 16,186, which, added to 6,999 Prussians, gives the aggregate allied loss 23,185. The French lost, as reported, 18,500 killed and wounded, 7,800 prisoners (the total loss was probably more than 30,000—some French accounts

WATER-MOTOR—WATER OUSEL.

raise the total list of *hors de combat* to 32,000), and 227 cannon captured.

There have been many unprofitable controversies among the Brit., French, and German historians concerning many points in this great battle. We note here, as evident, three faults of Napoleon—not, however, as assuming them to have been actually decisive of the result: (1) the late hour at which he began his attack, due to his not calculating on the ability of the Prussians to arrive on the field at all in the course of the day; (2) his at least ‘tacit consent’ to the frightful waste of his splendid cavalry reserve before 4 P.M.; (3) his neglect to take into account (though warned of it by Soult) the steadiness with which the Brit. infantry were always wont to hold their ground under assault.—Each of the three nations claims its right to give name to this famous conflict—the French calling it after *Mont St. Jean*, a chateau in rear of the British line; the Prussians after *La Belle Alliance*; while the true victors call it the *Battle of Waterloo*.—See Col. Chesney’s *Waterloo Lectures* (1868).

WA'TER-MOTOR: any contrivance by which the pressure of water is utilized as a motive-power; a turbine: see **WATER-POWER**. The name, however, is commonly restricted to small turbines in which the force of a jet of water obtained from the ordinary household water-supply can be utilized in driving light machinery, such as sewing-machines, ventilating-fans, coffee-mills, revolving show-cases, dentist's machinery, etc. It consists essentially of a small water-wheel inclosed in a metal shell, which may be attached to a well or set in a sink or other convenient place. The wheel usually consists of two shallow saucer-like plates soldered together at the edges, and having a series of small buckets on the periphery about an inch apart which are acted on by small jets of water from little nozzles on the end of a circular feed-pipe within the case and attached near the middle with the faucet of the water supply-pipe. On the projecting end of the spindle on which the water-wheel works is the driving-pulley, from which a belt extends to the friction-pulley of the mechanism to be operated. This form of water-motor is usually made in 5 sizes, from 8 to 36 in. water-wheel diameter.

WA'TER OU'SEL: see **DIPPER**.

WATER-POWER.

WATER-POWER: pressure of water used as a prime mover of machinery. The value of W.-P. depends much on the nature of the source of supply, whether steady or otherwise. Where streams supplying W.-P. are liable to great decrease in dry weather, large impounding reservoirs are necessary. On small streams there is generally a pond provided; but on large rivers there is, in general, only a weir or dam across the river to direct the water into the intake lade. The rise and fall of the tide also is used for driving water-wheels.

The most usual, and generally the most eligible, mode of applying water to driving of machinery is by means of a vertical wheel put in motion either by the water acting on blades or floats by impulse derived from its velocity acquired in falling, or by the weight of water being applied to one side of the wheel. The first mode of applying the water is generally applied in low falls, say under 6 ft., and to what is called an undershot wheel—i.e., a wheel where the effective head of water is below the level of the centre; and to make the application efficient, that portion of the periphery of the wheel measuring from the point of impact of the water to a point directly below the centre requires to be surrounded by a casing, generally of stone, but sometimes of cast-iron, called the arc, closely fitted to the extremity of the floats, so as to prevent any considerable escape of water.

The wheel, which may be either of timber or of cast-iron, or partly of both, consists (fig. 1) of axle, *a*; arms, *b*;

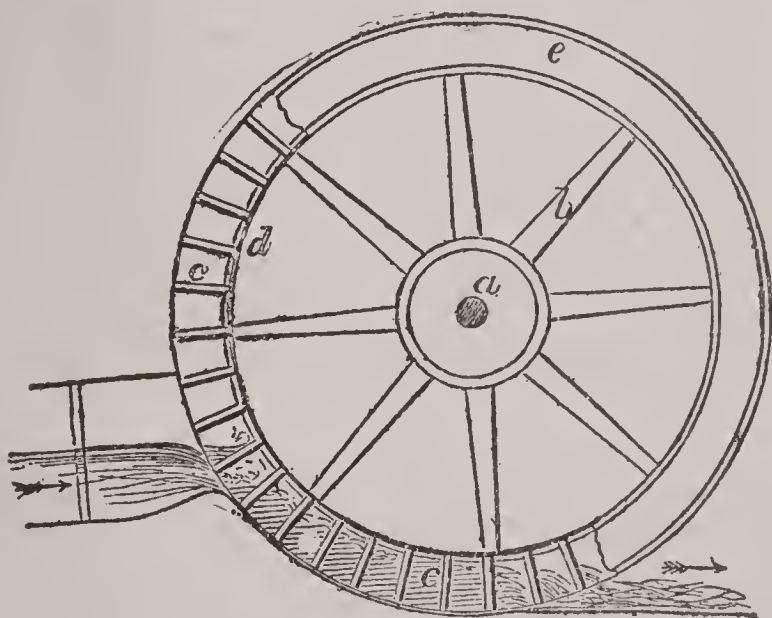


Fig. 1.

floats, which are generally radii of the circle, but are sometimes set a little obliquely to the radius, pointing up-stream, *c*; and generally there are also a sole, *d*, being a lining round the circumference at the lower edge of the floats, having openings for the escape of air; and a shrouding or circular plate, *e*, at each side of the wheel, and of the same depth as the floats. Sometimes, when there is very little fall beyond the mere current of the stream, the floats sim-

WATER-POWER.

ply dip into the water like the paddles of a steamboat, in which case no sole or shrouding is required; and to make allowance for the rise of the water in the tail lade during floods, which is generally called *back-water*, and seriously impedes and sometimes stops the motion of the wheel, occasionally the wheel and its axle are so constructed as to be capable of being raised or depressed together, without throwing the machinery out of gear. Sometimes all the machinery is on board a vessel moored in a river, so as to rise and fall with the level of the water, and thereby keep its water-wheel always immersed to the proper depth. At the old London Bridge water-works the wheels which rose and fell with the tide were worked by the current of both the flood and the ebb.

The other mode of applying the water to a vertical wheel, by making it act by its gravity, is the more perfect and eco-

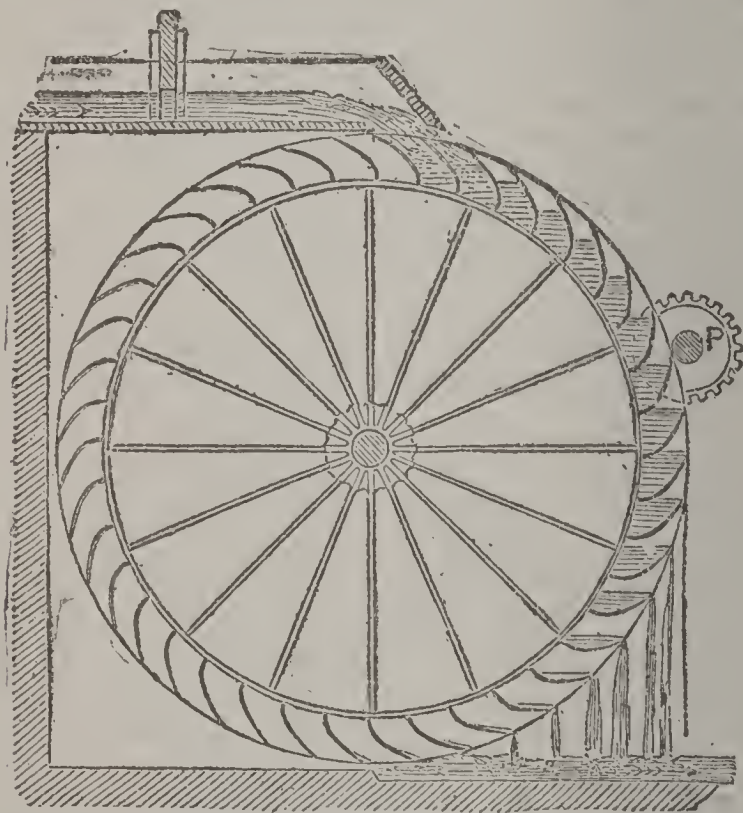


Fig. 2.

nomical mode where circumstances will admit, and is generally adopted in falls of any considerable height, say of 6 ft. and more, and where the water can be let on above the level of the centre. The wheels are called respectively *breast* and *overshot wheels*, according as the water is let on nearer the level of the centre than the crown of the wheel, or nearer the crown than the level of the centre of the wheel; and instead of floats they have curved or kneed buckets of such shape as to retain the water down to the lowest possible point. There are generally in good wheels ventilating openings in the sole for escape of air. The *overshot wheel* has this disadvantage, that, as the water has little or no power until considerably past the top centre, the wheel is burdened with a useless weight of water.

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The direct overshot wheel has the water run, without changing its direction, right over the top, as in fig. 2; which arrangement has this advantage, that, as the top of the wheel moves in the same direction as the stream, it gets the benefit of the whole initial velocity and impulse of the water; but, on the other hand, the bottom of the wheel, if at all immersed in water, which it generally is to some extent, meets with obstruction by moving against the current.

The *pitch-back overshot* is a modification of the preceding, making the water to pass alongside the wheel, and then to

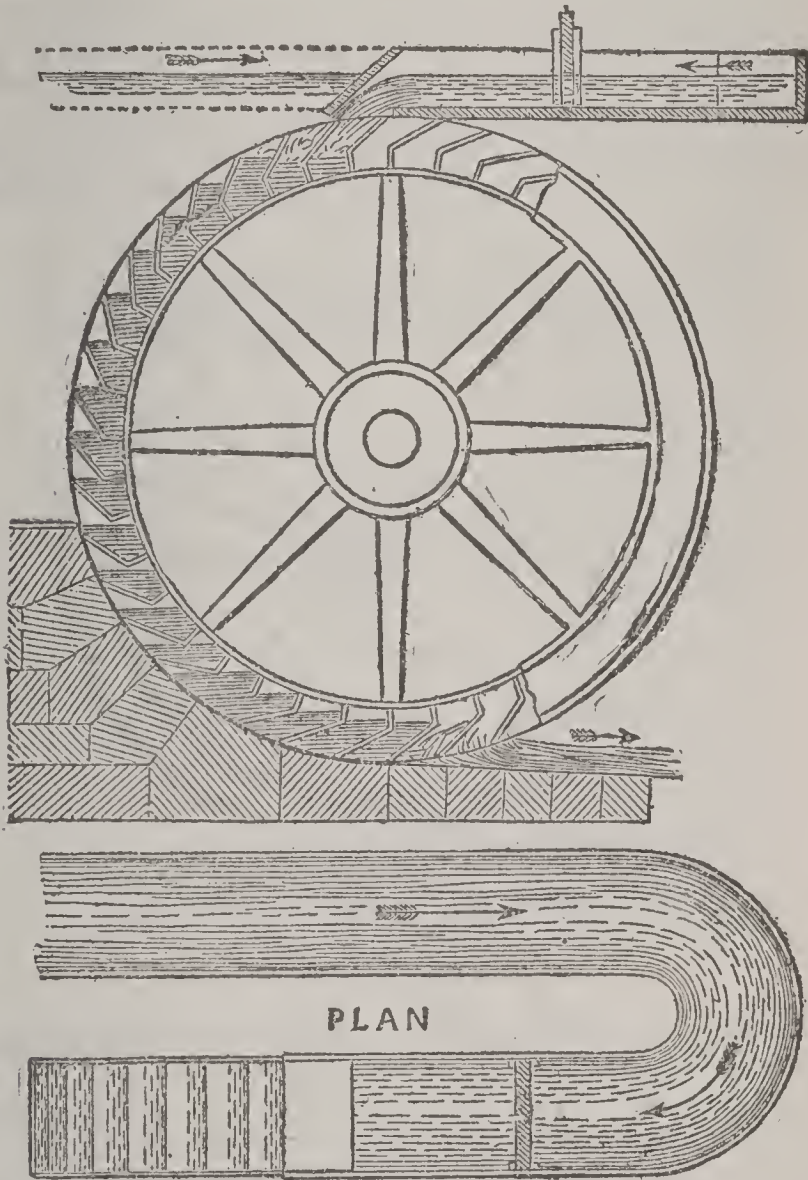


Fig. 3.

return and be let on the top of the wheel in a contrary direction, as in fig. 3. This requires longer and more complicated troughs, and by the change in direction part of the impulse from the water is lost; but the bottom of the wheel moves in the direction of the tail-water, and is not liable to be impeded by being immersed in it.

On the whole, it is generally thought better to apply the water at about 30 degrees from the top of the wheel. In such high-breast or nearly overshot wheels the water is let on to the buckets over the top of the sluice, which is made

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to open by lowering and shut by lifting, as in fig. 4. In this way, however small may be the quantity of water, it is always applied at the highest possible level, which is important when it is its weight multiplied by the height of descent, and not its impulse, that yields the effective power.

The structure of the overshot and breast wheel is nearly the same as that of the undershot, except in the substitution of curved buckets, as in figs 2 and 4, or angular buckets, as in fig. 3, for straight floats; but even in the undershot wheel the floats are sometimes made with a slight curvature.

In any kind of wheel the motion may be taken off the axle by torsion, which necessarily requires rigidity in the arms, as in figs. 1 and 3; or it may be taken directly off the periphery, when the power is applied to a pinion *P*, working into segments either external, as in fig. 2, or internal, as in fig. 4, attached to the shrouding. In this arrange

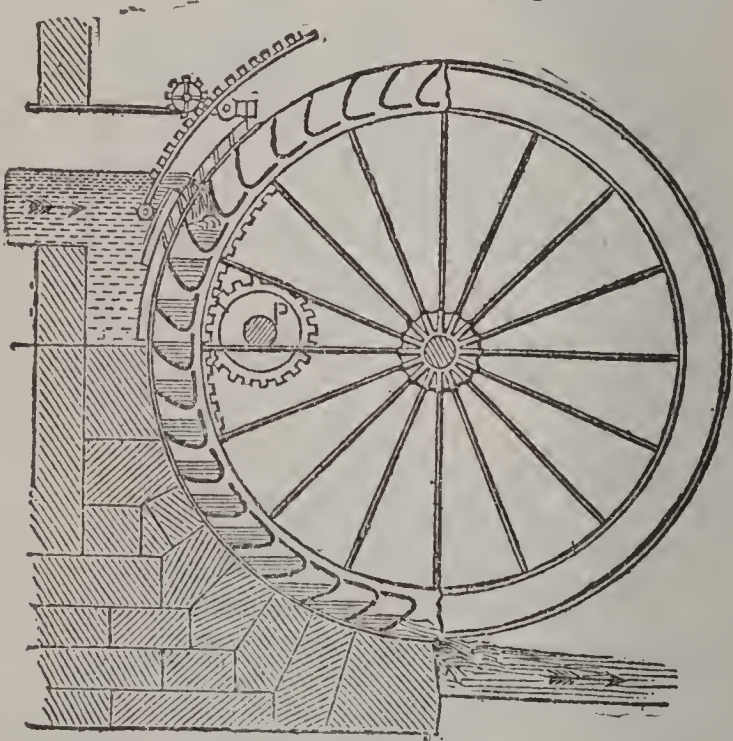


Fig. 4.

ment there is no torsion of the axle or transverse strain on the arms; therefore the latter are more often made of round wrought-iron rods, with a slight axle. This wheel is much lighter than with the massive axle and the strong wooden or cast-iron arms, and is called a *suspension* or *spider wheel*.

The weight of water being $62\frac{1}{2}$ lbs. to a cubic ft., 528 ft., falling vertically 1 ft. a minute, would be equal theoretically to 1 Boulton and Watt horse-power of 33,000 lbs. lifted 1 ft. a minute; but the effective power is far short of that, and 60 per cent. of it, requiring 880 cubic ft., falling 1 ft. a minute, is generally reckoned a fair allowance for an effective horse-power. Seventy-five per cent., requiring 704 ft., falling 1 ft. a minute is about the highest that has ever been spoken of, and it is doubtful whether more than 70 per cent. has ever been attained; while with low falls and imperfectly constructed wheels it is often reckoned that a

WATER-POWER.

horse-power requires nearly 1,000 cubic ft. a minute. The velocity of the periphery of an undershot wheel is usually 500 to 600 ft. a minute, and that of a bucket-wheel, overshot or breast, from 300 to 450 ft. It is seldom that

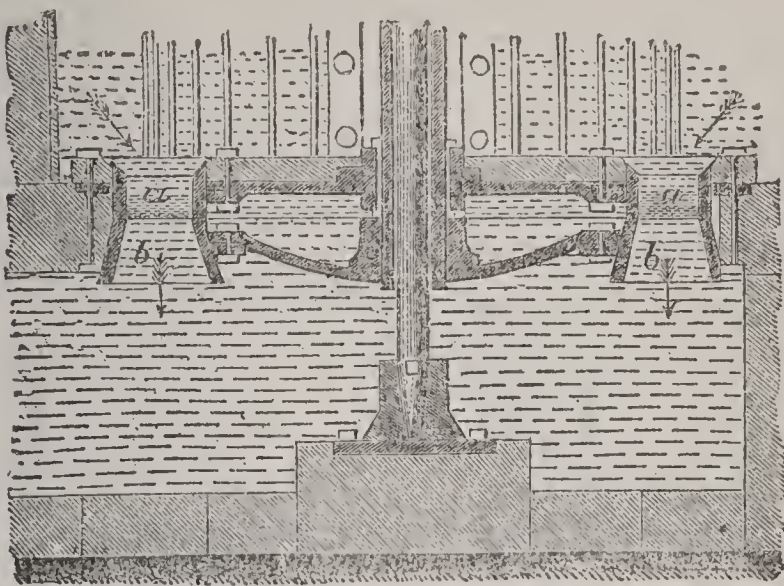


Fig. 5.

the whole height of a fall can be advantageously taken into use; for if the wheel be placed so low as to get the benefit of the whole height of the fall in low states of the water, very often it is liable, in floods, to have the lower rim immersed, and to be obstructed or stopped by back-water.

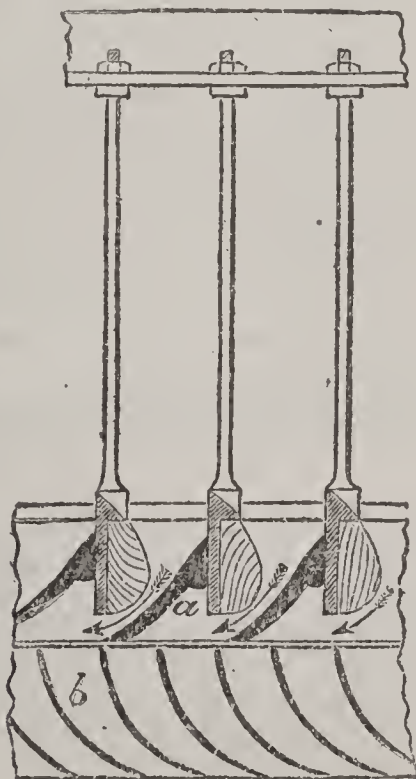


Fig. 6.

A noteworthy application of water-power is that of the Shaws Water-works, now the property of the corporation of Greenock: there the yield of nearly 7,000 acres of hill.

WATER-POWER.

ground is stored up in reservoirs of a capacity of 320,000,000 of cubic ft., and conveyed by an aqueduct about 6 m. in length to the outskirts of Greenock, which it reaches at the height of 512 ft. above sea-level, and is then divided into two lines of falls, one having 1,200 cubic ft. a minute for 12 hours a day, and the other the equivalent quantity of 1,066 ft. for $13\frac{1}{2}$ hours a day, divided each into 19 falls. One ft. of fall for each line is reckoned 1·8 horse-power, which is a very high computation, being 79·2 per cent. of the theoretical horse-power. At the 'Cotton Mill,' where both lines of falls are combined, there is what was for many years the largest water-wheel in existence, 70 ft.

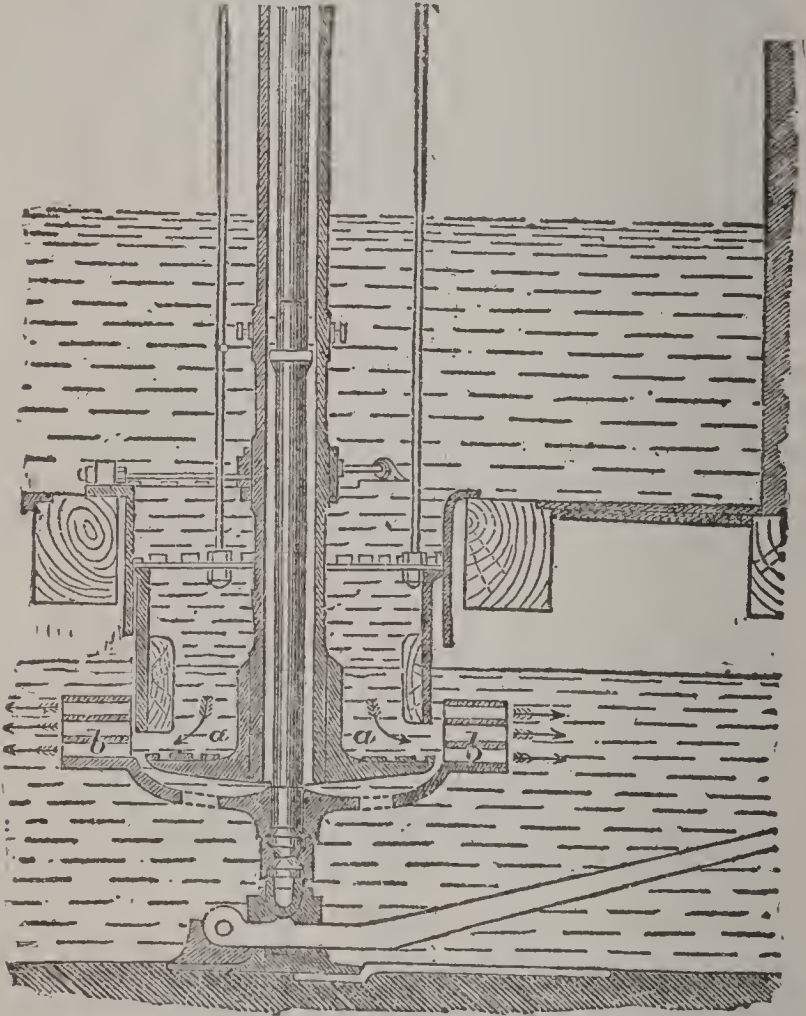


Fig. 7.

2 in. in diameter, 13 ft. wide, with 166 buckets, having a depth of 17 in. It has 2,266 cubic ft. of water per minute, with a fall of 64 ft. 4 in., and is therefore nearly 200 horse-power. By the Shaws computation, it would be 218 horse-power. It is a spider-wheel, taking the power off the circumference. At Laxey, in the Isle of Man, there is a water-wheel 72 ft. 6 in. in diameter, used to pump water from a lead and silver mine.

Horizontal Wheels.—In the proper turbine [from *It. turbino*, a whirlwind], the water passes either, first, vertically down through the wheel between fixed screw-blades, which give it a spiral motion, and then strikes similar blades attached to a movable spindle, but placed in the

WATER-POWER.

opposite direction, so that the impact of the water communicates a rotatory motion to the blades and spindle, as



Fig. 8.

shown in fig. 5, and in fig. 6 an enlargement of the parts, the fixed blades being marked *a, a*, and the movable por-

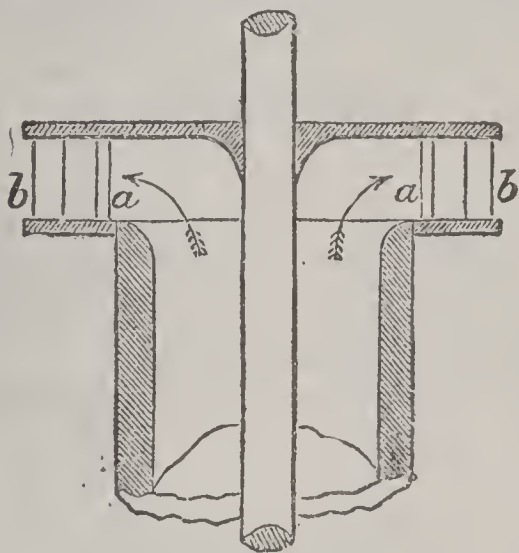


Fig. 9.

tion of the machine *bb*; or, second, a modification of the foregoing is to pass the water from the centre horizontally

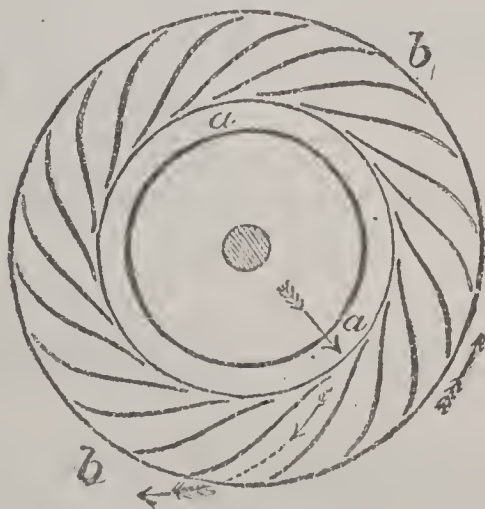


Fig. 10.

outward through fixed curved blades, *a, a*, figs. 7 and 8, so as to give it a rotatory or tangential motion, and there-

WATER-POWER.

by cause it to act on the blades of the wheel, bb , which revolves outside.

In the reactionary wheel, in principle almost identical with the Scottish turbine (see BARKER'S MILL), the water is admitted at the centre of the wheel from below, passes to the circumference between curved blades of the wheel,

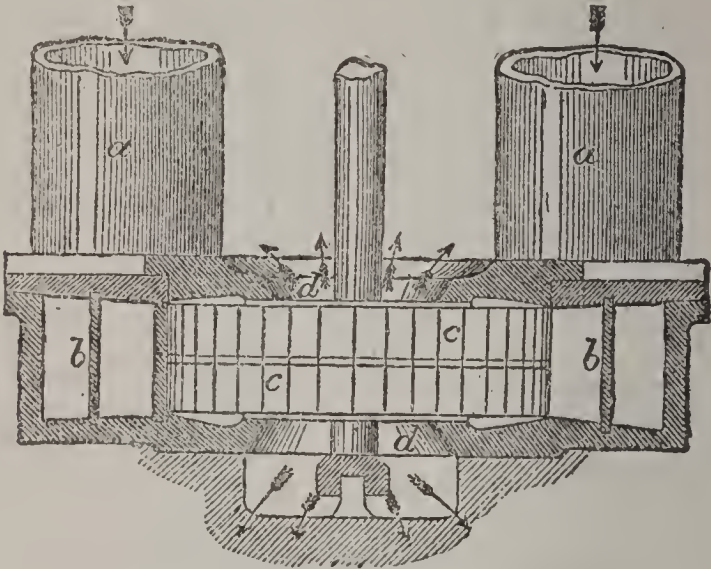


Fig. 11.

and escapes by tangential orifices at the circumference, there being valves made to open more or less, according to the quantity of water and to the power required. This form of turbine is shown in figs. 9 and 10, where the water enters at aa , and escapes by bb .

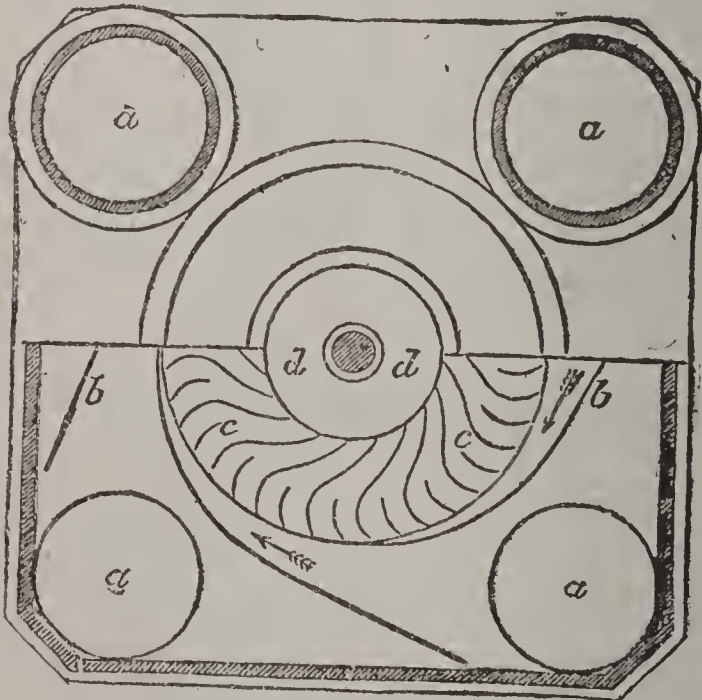


Fig. 12.

The vortex-wheel of Prof. Thomson (figs. 11 and 12) takes in the water after descending through the tubes, a, a , at the circumference, where, by means of fixed blades, b, b , it acquires a tangential motion, and then passes through between the curved arm, cc , of the wheel, and escapes at

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the centre, *dd*. As the two last-described wheels work always under water, they are not liable to be obstructed by back-water, or to have their power lessened thereby more than what *is* due to the diminished fall, and they are understood to yield a good percentage of power, sometimes stated at 75 per cent.; but all turbines are somewhat delicate, and liable to be choked by leaves or twigs, unless the water be carefully strained. Although only a few horizontal wheels are here described, they are exceedingly numerous.

The reciprocatory hydraulic engine (fig. 13) works ex

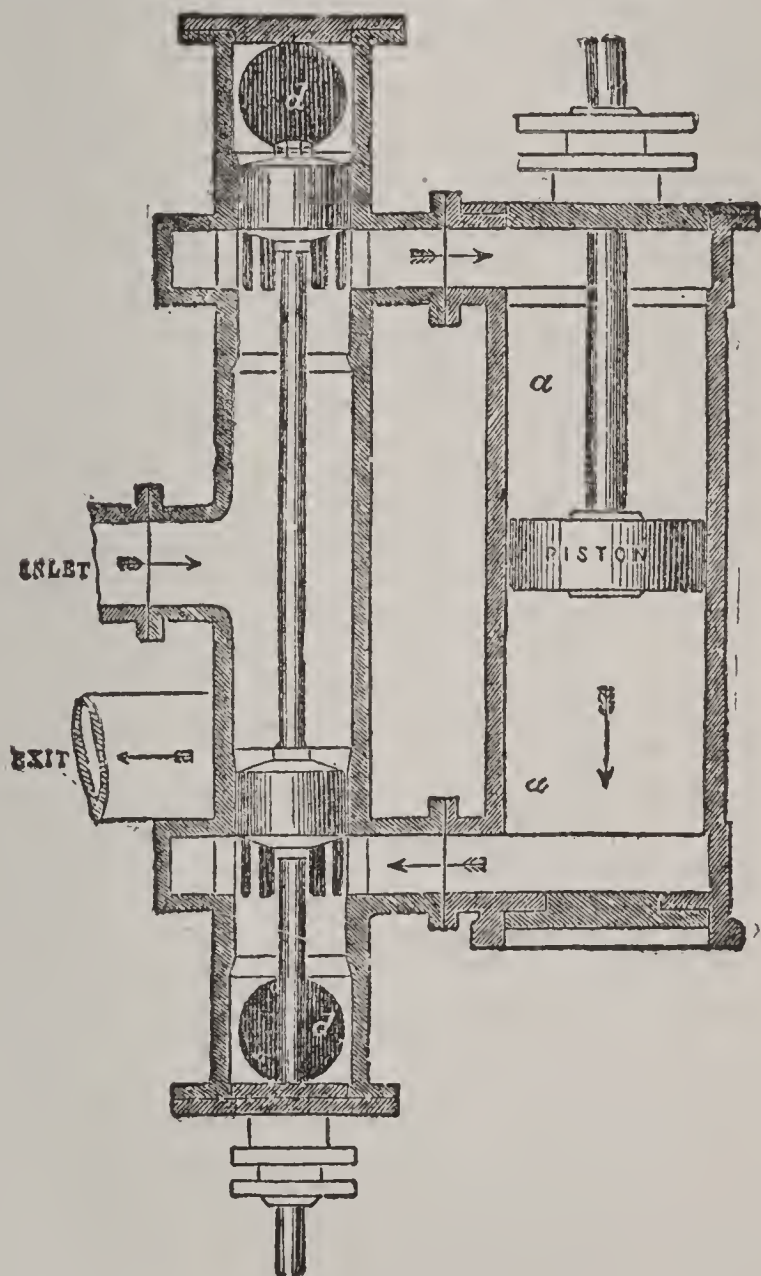


Fig. 13.

actly on the same principle as the ordinary non-condensing steam-engine. The water, under considerable pressure, is admitted at one end of a cylinder, *a*, the exit valve, *d*, at that end being simultaneously closed, while it is shut off from the other end, and the exit valve, *d*, there opened; and so the alternating action of the valves and of the piston goes on continuously. To work smoothly and effect-

WATER-PROOFING—WATERS.

ively, the piston ought to be of large diameter, in proportion to the length of stroke, and to go slowly; otherwise the quick jerking is apt to shake and to injure the engine; and generally it is better to have two cylinders and pistons working together, as that enables them to work more equally, and to turn the crank without the use of a fly-wheel.

The turbine and the reciprocatory engine have the advantage of being able to take the use of a fall much greater in height than the diameter of the largest wheel that can be made; but for all ordinary falls a good breast or overshot wheel, or even an undershot, is, on the whole, generally considered preferable.—See ELECTRIC TRANSMISSION OF POWER.

WATER-PROOFING: method or material by which a textile or other fabric is rendered water-proof. Besides the application of Caoutchouc (q.v.), peculiar methods have been employed to render cloth impervious to water, at the same time allowing the passage of air; the absence of this property in the impermeable caoutchouc manufactures having been found disadvantageous. Two plans are adopted for water-proofing woolen cloths without rendering them quite impervious to air. The first is to dip the cloths into a solution of soap, and thoroughly rub it into the texture, after which it is dipped into a solution of alum; a decomposition of the soap and alum is effected, and the minute openings between the fibres are in some way partly filled so as to exclude water. In the second plan the cloth is dipped into a solution of gelatine or isinglass, and afterward into a solution of galls. A kind of tanning process is the result, the gelatine which has pervaded the cloth being rendered as insoluble as leather by its union with the tannin of the galls.

WATERS, CLARA (ERSKINE) (CLEMENT): author: 1834 — — — — —; b. St. Louis, Mo. She has resided chiefly in Boston, Mass. Some of her more popular works are: *Handbook of Legendary and Mythological Art* (1871); *Painters, Sculptors, Architects, Engravers, and their Works* (1873); *Eleanor Maitland* (1881); *An Outline History of Sculpture, for Beginners and Students* (1885); *Handbook of Christian Symbols and Stories of the Saints, as Illustrated in Art* (1886); *An Outline History of Architecture, for Beginners and Students* (1886); *Stories of Art and Artists: Historical and Descriptive* (1886); *A History of Art, for Beginners and Students: Painting, Sculpture, Architecture* (1887). Among her translations are *English Conferences: Rome and Christianity; Marcus Aurelius*; by Ernest Renan (1880); and *Dosia*, by Henry Gréville (1882). In connection with Laurence Hutton she published *Artists of the Nineteenth Century, and their Works: a Handbook of Biographical Sketches* (1879). Most of her books on art, etc., are illustrated.

WATER-SUPPLY.

WATER-SUPPLY: methods by which water is supplied—or the amount of water so supplied—to a community for individual and domestic use, as in cooking, washing, etc., for irrigation or manufacturing purposes, etc. Water is as essential to animal and especially to human life as air and food; hence the strong and religious interest that has always been attached to the means of its supply. In the earliest records of civilization, we read of the digging of wells, and of quarrels about the possession of them. The 'Pools of Solomon,' near Bethlehem, which remain now almost as perfect as when built, were connected with a scheme for supplying Jerusalem with water. In Assyria and Persia, from the earliest times, water has been conveyed to towns from astonishing distances in open channels or canals and in subterranean tunnels or *kanats*. In Egypt also, and in China, gigantic works for conveying water, both for domestic use and for irrigation, have been in existence from remote antiquity. Nor were these undertakings confined to the eastern hemisphere; we have evidence of the existence of kindred works in pre-Christian America. The ancient city of Mexico, built on several islands near the shore of the lake, was connected with the mainland by four great causeways or dikes, whose remains still exist. One of these supported the wooden aqueduct of Chapultepec, constructed by Montezuma, and destroyed by the Spaniards when they besieged the city. Hydraulic works on a great scale had been executed also by the Incas of Peru. Of all ancient nations, the Romans gave the greatest attention to the supply of water, and carried the construction of *aqueducts* to the greatest perfection and magnificence. If we except the supply of a few great cities, the efforts at modern water-supply are as yet insignificant compared with those of the Romans (see **AQUEDUCT: NEW YORK [City]**—*Water Supply: ETC.*). It is only since the beginning of the sanitary movement, occasioned by repeated visitations of cholera, that the subject of water-supply, and especially the *quality* of water-supply, has seriously occupied public attention. The result of every inquiry and of all experience has been to bring out more strongly the decided effects on the health of a community arising from the quantity and quality of the water at their command; and as the river and surface sources of supply near the chief seats of population are becoming every year more contaminated by Sewage (q.v.), the drainage from manured land, the droppings of animals, and the refuse of manufactures, enterprise and engineering skill must be directed either to procuring a supply of pure subterranean spring-water, or to bringing pure water from greater distances than hitherto. See **SANITARY SCIENCE—Water**.

Sources of Water.

The ultimate source of all *fresh* water is Rain (q.v.). When it has fallen on the earth, it presents itself chiefly in the forms of surface-water, rivers, and springs.

Surface-collection.—Rain-water, as it is formed in the

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upper regions of the atmosphere, is the purest that nature supplies; but in descending it brings with it whatever impurities are floating near the surface, which in the neighborhood of towns are numerous, consisting of various gases, with soot and other floating particles, organic and inorganic. Rain-water has a strong affinity for organic impurities—that is, the corrupting ingredients derived from vegetable and animal bodies, which are diffused over every surface in the vicinity of living beings; hence, when collected from the roofs of houses, it has a tendency to rapid putrefaction. Being free from saline ingredients, it is excellent for washing, but is not generally pleasant to drink. But if we resort to a barren district of rock, destitute of vegetation, and remote from the pollution of towns, we may obtain water with comparatively little organic impurity.

Rivers.—The water obtained from running streams is in part what has flowed immediately from the surface, and in part the water of springs, shallow or deep. In any case, a considerable amount of contact with the ground has taken place; consequently saline and organic matter is liable to be dissolved in greater or less degree. The extent of the impregnation, as well as the kind of material dissolved, will depend on the rocks and strata of the river-basin.

River-waters, besides the qualities that they derive from their primitive sources, are apt to contain mud, decayed leaves, the exuviae of fish, and other matters in suspension; and are thus deficient in the clearness and transparency essential to the satisfaction of the eye in a drinking-water. Moreover, the water partakes of the extremes of summer and winter temperature. But the great objection to water from rivers is their general pollution from the manure used upon the land, sewage, and manufactures. Rivers that issue from lakes are generally the purest, as the suspended matter has time to be precipitated.

Springs.—The qualities that recommend water to the eye and to the palate belong in a pre-eminent degree to spring-water (see SPRING): it is clear, sparkling, and of agreeable and uniform temperature at all seasons of the year (usually about 50° Fahr.); it is well aerated, and is totally free from the offensive taint common in all other waters, as well as devoid of the animalcules generated by organic impurity; and where a sufficient number of springs can be collected to suffice for a town, it is the most desirable of all sources of supply.

Quality of Water.

Perfectly pure water is hard to find; rain-water, and even artificially distilled water, are only approximates. The chief impurities may be considered under the heads of Mineral Matter in Suspension, Mineral Matter in Solution, and Organic Matter.

Mineral Matter in Suspension.—When running water comes upon a loose bottom, it carries the finer particles of sand and earth along with it. If the water comes into a

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position of perfect stillness, the matters thus floated gradually sink to the bottom again. Particles of clay, owing either to their excessive fineness or to their adhesive attraction for water, subside very slowly, and impurities of this nature are not easily remedied. Besides earthy matter, compounds of iron and lead are also in some circumstances present in a solid state, and filtering may be employed for riddance of them. To separate clay-powder from water, the practice has long been resorted to in India and China of putting in a piece of alum, which seems to produce a kind of coagulation.

Dissolved Mineral Matter.—Spring-water, which is generally clear and sparkling, holding no solid matter in suspension, is seldom without a large amount of dissolved mineral matter, sometimes as much as 2 parts in 1,000, commonly from 1 in 1,000 to 1 in 20,000. River and surface water also contain more or less dissolved minerals (see MINERAL WATERS). The great bulk of the solid matter held in solution in ordinary waters consists of the salts of sodium, potassium, calcium, and magnesium: the most material are the salts of calcium and magnesium, as they are the causes of what is called ‘hardness’ in water. The most important salt of calcium is the soluble hydric carbonate formerly known as *bicarbonate*, derived from chalk or limestone. Chalk or limestone is a *carbonate* of calcium (otherwise *calcic carbonate*)—i.e., a compound of lime with one equivalent of carbonic acid (carbonic dioxide)—and is almost insoluble in water; but when water containing an excess of carbonic acid—as is the case with spring-water especially—passes over limestone, it gives the carbonate a double dose of carbonic acid, and converts it into bicarbonate, which is soluble. The waters having calcium bicarbonate for their chief impurity are familiarly spoken of as the chalk-waters. The other salt of calcium often present in water is the *sulphate* or *gypsum*. The important distinction between the bicarbonate and the sulphate lies in the fact, that the first, the bicarbonate, may be in great part precipitated, or thrown down in solid form, by boiling, which drives off the solvent carbonic acid; whereas the second, the sulphate, cannot be so precipitated. The chief effect of the boiling takes place in the first five minutes.

Apart from its hardness, it has been made a question whether water containing salts of lime is injurious or not to the human constitution. Most physiologists are agreed that water free from this as from other impurities, is the best for the health of animals and man.

With regard to magnesium, its salts are well known to act as powerful medicines when taken in large doses, and it may be presumed are not altogether without effect in the small quantities existing in ordinary magnesian waters. A medical observer has declared that magnesium is the characteristic ingredient of waters in the districts where the diseases called *cretinism* and *goitre* abound.—Of salts of *sodium* and *potassium*, the principal is common salt, or the chloride of sodium. Sodid sulphate (Glauber’s-salt) occurs with the chloride in the salt-springs of watering.

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places as well as in the sea-waters. None of all these salts have any effect on the hardness. In the case of sea-water, which is very hard, the effect is due not to common salt, but to the lime and magnesian salts dissolved in it; were it not for these, sea-water would be perfectly suitable for washing, though not for drinking.—Salts of *iron* in considerable quantity make what are technically named *chalybeate* waters, which belong to the medicinal class. When the iron exists in the spring as carbonate, which is the most usual case, on exposure to the air, it is changed into the peroxide, and falls down in the form of an ochery precipitate. Salts of iron give an inky taste to the water, and a yellowish tint to linen washed in it.

Hardness in Water.—The quality of hardness in water is commonly recognized by the difficulty experienced in washing, and by the amount of soap necessary to form a lather. This quality is injurious also in the preparation of food; but its action is noticeable most commonly in washing operations. It occasions the chapping of the skin, an enormous waste of soap, an extra labor, and a corresponding tear and wear of clothes. Every grain of chalk contained in water decomposes 10 grains of soap; thus the hardening matter contained in 100 gallons of water, e.g., such as is supplied to London, will destroy 35 ounces of soap—that is, the first 35 ounces of soap added to this quantity of the water will disappear without forming any lather, or having any cleansing effect. Soap is a compound, formed of an alkali (soda or potash) joined to an oily acid. When a salt of lime, then, is present in the water, the lime decomposes the soap, and combines with the oily acid to form a lime-soap, which is insoluble and has no detergent properties.

The most usual hardening ingredients are the salts of lime. Salts of magnesium and of iron also are hardening salts. Salts of sodium and potassium have no hardening effect. Prof. Clark, of Marischal College, Aberdeen, devised a scale of hardness now universally employed in the chemical description of waters. The hardening effect that would be produced by one grain of chalk dissolved in a gallon of water is one degree of hardness; in like manner, four grains per gallon would produce four degrees of hardness; ten grains, ten degrees; and so on. The degrees are expressed in numbers—thus, 1°, 4°, 10°, 15°, etc. The degree of hardness of any particular water can be readily and exactly determined by Clark's Soap Test (see SOAP-TEST).

Next to washing, the deleterious consequences of hardness are felt in various culinary operations, especially in the furring of boilers and cooking utensils. In the infusion of tea it is well known that more tea is required in making an infusion of certain strength when hard water is used than when soft water is used. Hard water also renders the infusion muddy. Subcarbonate of sodium in crystals, by decomposing the earthy salts, improves the water; but if more is added than what will exactly decompose the earthy salts present, it injures the fine flavor of the tea. It

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may be stated generally that for the purposes of washing and cooking a water of less than 6° is soft, but above this point the hardness becomes objectionable. At 8° the water is moderately hard; at 12° it is very hard; at 16° the hardness is excessive.

To make these observations more intelligible, we may mention a few instances of known waters in Great Britain, with their place in the scale. In Keswick, England, the water is under half a degree of hardness; in Lancaster it is $1\frac{1}{2}^{\circ}$; and in Manchester 2° . The water of the Dee at Aberdeen, Scotland, used for supply of the town, is $1\frac{1}{4}^{\circ}$ of hardness. The water of Loch Katrine is of great purity, having only two grains of solid matter of all kinds in the gallon, and 1° of hardness. The waters of the Welsh mountains, from which it has been proposed to supply London, have on an average less than 2° . The river Clyde, which formerly supplied Glasgow, is $4\frac{1}{2}^{\circ}$, and may be reckoned a soft water. The Thames at London, as well as the New river, is about 14° ; while many of the tributaries of the Thames are as high as 16° ; but all being chalk-waters, they may be materially softened by boiling. Springs from the chalk commonly range from 16° to 18° ; but particular springs are found in some parts of the world four or five times as hard, from the presence of bicarbonate of lime. The water of the treasury pump in London has from 50° to 60° of hardness. In many parts of the continent of Europe hard waters abound; but the testing of waters has not been general and thorough there, nor in the United States.

Lead in Water.—Injurious effects have frequently arisen from contamination of water with lead, derived from leaden pipes and cisterns. Some kinds of water are known to act powerfully on a leaden surface, and others scarcely at all; but the qualities and circumstances on which the action depends have not been satisfactorily determined. Distilled water, and soft lake and river waters in general, act most decidedly, but not in proportion to their softness. The presence of air in the water seems one essential condition; light also increases the action, as does the presence of vegetable matter: it has been observed that when leaves drop by chance into a lead cistern the spots where they lie become visibly corroded. The water of Loch Katrine in Scotland, according to extensive sets of experiments by distinguished chemists, has an intense action on lead when bright and highly polished, and when the lead and water are freely exposed to the access of air; but not when the metal is in its ordinary dull state. The coating formed on the surface of the metal is held to protect it from further chemical action. Still there are opposing facts to show that this protective action is not always to be trusted, and that water that has passed through any considerable length of lead pipe, or stood for some time in a short lead pipe, or in a lead cistern, should never be used without care; a ninth part of a grain of lead per gallon has been known to derange the health of a whole community.

Organic Impurities.—The contamination of water by

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vegetable and animal substances takes place in various ways: see SANITARY SCIENCE. The most obvious and abundant source of this class of ingredients is the sewage and refuse of towns; and next in order may be ranked the contact with soils rich in organic matter. Among organic impurities may be classed offensive gases, such as carburetted, sulphuretted, and phosphuretted hydrogen; vegetable fibres in a state of rottenness; putrefying products of the vegetable or animal kingdoms; starch, muscular fibre, etc.; urea and ammoniacal products; vegetable forms—algæ, confervæ, fungi, etc.; animalcules—infusoria, entomostracæ, annelidæ or worms, etc. Water falling on a growing soil, and running off the surface to lie in stagnant ponds, is in very favorable circumstances for being tainted with vegetable and animal life. Water-plants will spring up and feed numerous tribes of animalcules, and each pool will be a constant scene of vitality. In such a state the water is usually unfit for drinking. The surface-water of a district overgrown with peat-moss has usually a peaty flavor, as well as a dark and dirty color. The infusion of peat does not breed animalcules, being a strong antiseptic; nevertheless it is an objectionable ingredient. It is doubtful whether any specific unwholesomeness can be justly attributed to peat-water; but it is unpalatable, and its use is shunned by inhabitants of peaty districts, and even by cattle.

Chalk-water, which, as it issues from a spring, is perfectly free from organic matter, has a source of contamination within itself. When exposed to light and air, the duplicate dose of carbonic acid that keeps the chalk dissolved becomes decomposed; and the carbon of the decomposed acid gives rise to a green vegetation, which soon acquires an offensive marshy smell.

Organic matter in a putrefying state forms the worst kind of contamination that water can have. Though we may not know the precise effects of these impurities on the animal system, the single fact of their rendering the water repulsive to the taste and nauseous to the stomach is sufficient to condemn their use. As to the plea of smallness of amount of the impurity in a given water-supply, the highest medical authorities hold that it is impossible to say how small a quantity of organic matter in a state of fermentation may not do harm. Experience, under careful scientific observation and statistical record, has abundantly shown that organic impurity in water is prejudicial to health.

It is a common notion that *every drop of water teems with life*; but this is a mistake. Deep wells, and spring-water in general, contain little or no living organic matter. Consequently it is possible to obtain a liquid perfectly free from animalcules and vegetation. The presence of living creatures, vegetable or animal, discernible either by the naked eye or by the microscope, is a proof of organic taint in the water, and is one of the tests of this kind of impurity. With respect to rain-water, Hassall states: 'I have made several examinations of rain-water immediately after its descent to the earth, obtained in both town and country,

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and can confidently assert that it does not, in general, contain any form of living vegetable or animal matter.' The conditions necessary for the development of vegetation and animalcules, besides the presence of matter for them to feed on, are *air, light, and stillness*. With regard to the probable effects on health of living creatures contained in water, Hassall's observations are worthy of attention: 'All living matter contained in water used for drink, since it is in no way necessary to it, and is not present in the purest waters, is to be regarded as so much contamination and impurity—is therefore more or less injurious, and is consequently to be avoided. There is yet another view to be taken of the presence of these creatures in water—viz., that, where not injurious themselves, they are yet to be regarded as tests of the impurity of the water in which they are found.'

Means of Purifying Water.

The mechanical impurities of water, or the solid particles rendering it muddy or milky, may in most cases be removed by mechanical means. The two processes for this purpose are *subsidence* and *filtration*. The effects of subsidence are strikingly seen in rivers that pass through lakes: see GEN-EVA, LAKE OF. The subsidence of solid particles depends on their own weight, as compared with the weight of an equal bulk of water. To favor the process, the most perfect stillness should be allowed. It is expedient to have partitions placed in the subsiding reservoirs at short intervals, more effectually to prevent the agitation of the water. The water should be run off from the top, and not from the bottom. By making the bottom of the subsiding reservoir form a declivity from opposite sides, and providing means to let off the water occasionally from its lowest depth, it is possible to get riddance of the subsided mud. It is always found of advantage in clearing water from solid particles, whether by subsidence or by filtration, to mix together streams of different qualities.

In constructing an artificial filter on a large scale, a basin is formed, having the floor nearly level, but slightly inclining toward a centre line, and made water-tight by puddling the bottom and sides with clay. On the floor is laid a series of layers of gravel, coarse at first, and gradually finer upward; next a layer of slate-chips or sea-shells; then one of coarse sand, on which is placed the actual filtering layer of fine sand. The depth of this layer is 12 to 30 in., that of the entire mass 4 to 6 ft. The water, being admitted gently on the top of the sand, sinks down and is conducted by a series of channels, generally of tile-pipes, into the main drain. A filter in a clean state will pass 12 to 18 vertical ft. of water in 24 hours. The solid matter intercepted does not penetrate more than three-fourths of an inch into the sand; so that, by removing a thin film of sand from the surface, the filter is again clean. What is scraped off the top is capable of being washed and put again to use.

The cleansing power of sand can hardly be accounted for on the theory of mere mechanical interception. Though there is no chemical action, strictly speaking, there is no

doubt that the attraction of adhesion is at work—a power that plays a greater part in natural processes than has generally been assigned to it. Some substances manifest this adhesive attraction more strongly than sand, and have therefore still greater efficacy as filters; though practically, and on the large scale, sand is most eligible. Powdered charcoal has long been known as a powerful filtering medium, attracting and detaining especially organic matter. Animal charcoal, or that derived from burning bones, is still more efficacious than wood charcoal; a filter of animal charcoal renders London porter almost colorless.

According to recent researches, it seems that loam and clay have similar properties, and may be made available as filters. The filthiest liquids, such as putrid urine and sewer water, when passed through clay, drop from the filter colorless and inoffensive.

For filters for domestic use, see FILTER.

Softening of Water rendered Hard by Chalk—Clark's Process.—We extract the inventor's own account of it (retaining the old nomenclature) as read at the meeting of the Soc. of Arts:

‘In order to explain how the invention operates, it will be necessary to glance at the chemical composition and some of the chemical properties of chalk; for while chalk makes up the great bulk of the matter to be separated, chalk also contains the ingredient that brings about the separation. The invention is a chemical one for expelling chalk by chalk. Chalk, then, consists, for every 1 lb. of 16 oz., of lime, 9 oz.; carbonic acid, 7 oz.

‘The 9 oz. of lime may be obtained apart, by burning the chalk, as in a lime-kiln. The 9 oz. of burnt lime may be dissolved in any quantity of water not less than 40 gallons. The solution would be called lime-water. During the burning of the chalk to convert it into lime, the 7 oz. of carbonic acid are driven off. This acid, when uncombined, is naturally volatile and mild; it is the same substance that forms what has been called soda-water, when dissolved in water under pressure.

‘Now, so very sparingly soluble in water is chalk by itself that probably upward of 5,000 gallons would be necessary to dissolve 16 oz.; but by combining 1 lb. of chalk in water with 7 oz. additional of carbonic acid—that is to say, with as much more carbonic acid as the chalk itself contains—the chalk becomes readily soluble in water, and when so dissolved is called bicarbonate of lime. If the quantity of water containing the 1 lb. of chalk with 7 oz. additional of carbonic acid were 400 gallons, the solution would be a water of the same hardness as well-water from the chalk-strata, and not sensibly different in other respects.

‘Thus it appears that 1 lb. of chalk, scarcely soluble at all in water, may be rendered soluble in it by either of two distinct chemical changes—soluble by being deprived entirely of its carbonic acid, when it forms lime-water, and soluble by combining with a second dose of carbonic acid making up bicarbonate of lime.

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‘Now, if a solution of the 9 oz. of burnt lime, forming lime-water, and another solution of the 1 lb. of chalk and the 7 oz. of carbonic acid, forming bicarbonate of lime, be mixed together, they will so act upon each other as to restore the 2 lbs. of chalk, which will, after the mixture, subside, leaving a bright water above. This water will be free from bicarbonate of lime, free from burnt lime, and free from chalk, except a very little, which we keep out of account at present for the sake of simplicity in this explanation. The following table will show what occurs when this mutual action takes place:

AGENTS.	PRODUCTS.
Bicarbonate of lime in 400 gallons .	$\left. \begin{array}{l} \text{Chalk} \quad . \quad 16 \text{ oz.} \\ \text{with} \\ \text{Carbonic acid } 7 \text{ oz.} \end{array} \right\} = 16 \text{ oz. of chalk}$
Burnt lime in 40 gallons of lime- water 9 oz.	
	} = 2 \text{ lbs.}

A small residuum of the chalk always remains not separated by the process. Of $17\frac{1}{2}$ grains, for instance, contained in a gallon of water, only 16 grains would be deposited, and $1\frac{1}{2}$ grains would remain. In other words, water with $17\frac{1}{2}^{\circ}$ of hardness, arising from chalk, can be reduced to $1\frac{1}{2}^{\circ}$, but not lower.

‘These explanations will make it easy to comprehend the successive parts of the softening process.

‘Supposing it was a moderate quantity of well-water from chalk-strata that we had to soften, say 400 gallons. This quantity, as has already been explained, would contain 1 lb. of chalk, and would fill a vessel 4 ft. square by 4 ft. deep.

‘We would take 9 oz. of burnt lime, made from soft upper chalk; we first slack it into a hydrate, by adding a little water. When this is done, we would put the slacked lime into the vessel where we intend to soften; then gradually add some of the water in order to form lime-water. For this purpose at least 40 gallons are necessary, but we may add water gradually till we have added thrice as much as this; afterwards we may add the water more freely, taking care to mix intimately the water and the lime-water or lime. Or we might previously form saturated lime-water, which is very easy to form, and then make use of this lime-water instead of lime, putting in the lime-water first, and adding the water to be softened. The proportion in this case would be one bulk of lime-water to ten bulks of the hard water.’

It is of importance that the lime-water—that is, the softening ingredient—be put into the vessel first, and the hard water gradually added, because there is thus an excess of lime present up to the very close of the process. Instead of lime-water, the lime itself may be put at once into the vessel, and some of the water to be softened gradually added to dissolve it. The softened water thus obtained has no action on lead-pipes or cisterns, as many soft waters have. One ton of burned lime, used for softening, will produce $3\frac{1}{2}$ tons of precipitate.

The process should always be carried out in suitable

covered reservoirs, and is then found to be as conveniently applicable, and even more so, for softening large as small quantities; and spring-water varying from 18 to 20 degrees of hardness by Clark's scale is thus readily softened down and supplied to the consumers at from $2\frac{1}{2}$ to $4\frac{1}{2}$ degrees of hardness. The process for several years past has been in use at Sandhurst, 105 m. n.w. of Melbourne, in Australia, for lessening the amount of organic matter always found to exist in surface-water impounded in large open reservoirs or artificial lakes, and for this purpose is very superior to filtration through sand. Indeed, in the warm climate at Sandhurst the amount of organic matter becomes so great as to plug up the pores of the sand and render filtration impracticable.

Natural Process of Purification from Organic Matter.—Though, by means of sand and other filters, or of the liming process, organic contamination of water may be much reduced, there still remains enough to render the water unsafe for use. Is water, then, once corrupted with organic matter, hopelessly and permanently so? This question can be answered in the negative. Filthy water has a tendency to purify itself, and this in two ways. In the first place, in any shallow stream of polluted water, such as the kennels of a street, there may be observed long brushes of a sort of slimy vegetation adhering to every projection of the bottom. All this matter has been disengaged from the water, which thus flows away so much the purer. The second and most effective part of the natural purification consists in the actual decomposition of the impurities. The nitrogen of the decaying matter, then, goes to form nitric acid, which, uniting with bases, forms salts of the class called *nitrates*, of which saltpetre is one. Thus, what was in a state of putrefactive change, offensive to the senses, and causing dangerous disorders, is changed in course of time into a stable and harmless product. This process is constantly going on in rivers and other waters containing organic matter. In streams passing through populous districts, the contamination goes on at a rate far beyond the power of natural purification; but we can easily conceive how a river, much contaminated with organic impurities at one part of its course, may, after flowing a long way through an uninhabited tract, be almost restored to its natural state. The process is one of oxidation, and takes place at the expense of the free oxygen, of which, in healthy normal water, there ought to be 29 per cent. of the entire volume of gases held in solution.

The oxidation is much favored and hastened when the water percolates or filters very slowly through porous beds of earth. If the filtration has been sufficiently prolonged to convert all the decaying matter into carbonic acid or nitrates, the water will be pure, as far as the organic taint and the presence of animalcules are concerned, and will, in fact, be neither disagreeable nor unwholesome, the amount of the dissolved carbonates or nitrates being unimportant.

It has been proved by direct experiment that decompos-

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ing organic matter passed through a filtering-bed is changed into nitric acid. It is probable that other earthy matters, such as loam and clay, may have a still more decided influence than that of sand in hastening the formation of the nitrates; and perhaps by imitating more closely the slow mode of filtration by which nature converts surface-water into spring-water, it may yet be practicable to make the most contaminated waters fit for use.

Aëration.—Artificial aëration has been applied with much success in this country to purifying water from organic matter. Air is pumped into the mains under pressure necessarily, and travelling with the water exercises a remarkably purifying effect on it. Its application has not hitherto been extensive.

Conveyance, Storage, and Distribution.

Into the engineering operations connected with the conveyance of water from its source to the town to be supplied, we need not enter, beyond noticing that, when the source is below the level of the houses, steam or other power is necessary to lift or propel the water to the necessary height; while in the more general and more desirable case of the source being higher than the place where the supply is to be delivered, the water is made to flow by its own gravitation, either in a channel or culvert with a continuous descent, as in the ancient Aqueduct (q.v.), or in the simpler and more economical modern plan of a line of cast-iron pipes following the inequalities of the surface. The annexed diagram represents an outline of this mode of conveyance, where *a* is a lake or reservoir in a mountainous



Fig. 1.

district, and *b* a town separated by several miles of irregular country; the course of the pipes is indicated by the dotted line, and the pressure of the water at *a* suffices to make the water rise at *b* to a height nearly equal to that at the head. In many cases, both principles are employed, the water flowing mostly in a gently sloping conduit, tunnelled through hills where necessary, and being carried through valleys in tubes descending and ascending—an inverted siphon, as it is called.

The extent of the storage in reservoirs depends on the nature of the supply. If water is derived from perennial springs whose minimum flow equals the maximum demand, the storage may be the least possible. If a river is the source, the reservoirs should be large enough to hold such a stock as will carry the consumers over the periods when the river is polluted by rains; they should also be large on the principle of allowing time for purification by subsidence, especially if artificial filtration be not employed. In places where the supply is obtained from surface-drainage, or from a small stream, the practice is to build reser-

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voirs capable of containing a five or six months' supply, it being necessary to provide against the greatest droughts that ever happen in any season. The reservoirs should be deep, so as to prevent vegetation; and the distributing or service reservoirs should be roofed.

In distributing water over a town, in some European towns an *intermittent* system was formerly in use: on this system water is issued once a day, or once in two or three days, and fills a tank attached to every separate building, and from this tank the water is drawn off as required. The feeding pipe of such a tank or cistern is provided with a ball-cock (see fig. 2), which ingeniously shuts off or admits the supply, as the cistern may be full or empty. On the *constant* system, which is practically the only system in use in this country, and is far superior to the other, no tank is needed except for certain special parts of the

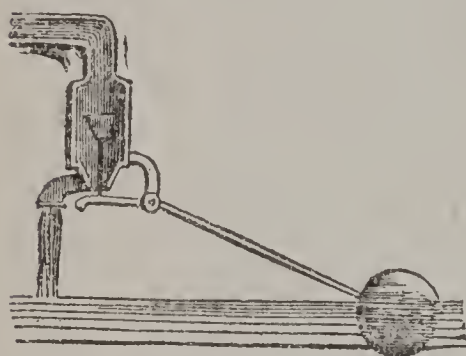


Fig. 2.

apparatus within a house—the house-pipes being kept constantly charged through connection with the distributing reservoir, which must therefore be higher than the highest building to be served. An important advantage of the constant system, where the pressure can be kept always at an adequate height, is the ease with which water can

be had in time of fires. The water being supplied at a high pressure, all that is necessary is to affix a hose to the water-plug in the street, when a jet corresponding in height to the pressure is obtained, and immediately directed against the fire.

Cisterns, Pipes.—Because of the action of water on lead, above described, it is desirable to avoid the use of lead in connection with very soft lake or river water. With regard to lead *pipes*, if the precaution is taken, when the water has stood for any time in them, of allowing the first portions to run off before any is taken for use, little danger can arise; but either lead *cisterns* should be wholly avoided, or means taken to ascertain whether they contaminate the water; and if so, a remedy should be applied. There are various substitutes for lead as a lining for cisterns. Slate slabs are highly recommended. Gutta-percha is found to be an easily fitted, cheap, and durable lining. For a few days the water tastes of the naphtha used in applying the lining; but afterward, no kinds of water, nor even acids, have any action on the gutta-percha. Pipes of gutta-percha also may be used; they are cheap and easily fitted up, but are less durable than metal.

Common Wells.—The simplest of all water-supplies is that of a rural dwelling with a good spring rising to the surface close by. A surface-spring should always be covered, and made to issue by a pipe. Deep wells should invariably be covered, and carefully protected from infil-

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tration of superficial ooze. See ARTESIAN-WELLS: TUBE-WELL.

Holly System.—This system of water-supply, originated by B. Holly, Lockport, N. Y., has been extensively introduced in this country: it consists in pumping water directly into the mains, the pumps being regulated so as to maintain a specified pressure, without the intermediation of a reservoir or water-tower of any kind. Thus the water is always immediately available, without need of a fire-engine to throw it into a burning building. For this system the water-pipes require much strength.

WATER-TOWER: portable pipe through which, when erected vertically, water is forced for extinguishing fires. The pipe is in sections that may readily be joined end to end, and raised like a tower to a height equal to their total length. The base section is secured on trunnions; to it beneath is attached a hose from the water-main in the street or from a fire-engine. The requisite number of sections having been joined together, the tower is raised to the perpendicular, and the head of water turned on. Another form of W.-T. consists of a derrick which is raised to perpendicularity by two chemical engines, in which the piston is actuated by pressure of carbonic acid gas, generated on the spot by the reaction of sulphuric acid on sodium bicarbonate. The derrick having been made to stand erect, the pipe is raised above it to the requisite height by means of a hand-winch, pulleys, and a wire rope. The nozzle can be directed from below at will toward any point.—Water-tower is one of several kinds of apparatus denoted by the term Stand-pipe.

WATERTOWN, *waw'tér-town*: town in Middlesex co., Mass.; on the Charles river, and on the Fitchburg railroad; 6 m. w. of Boston. It contains 8 churches, high school, public library, U. S. arsenal, 1 national bank (cap. \$100,000), 1 savings bank, weekly newspaper; and manufactories of paper bags, carpet lining, stoves, starch, needles, laundry machinery, and foundry products. Prof. Eben N. Horsford, of Harvard Univ., has claimed for W. that it is the site of the city or town of Norumbega, founded by the Northmen more than 800 years ago. The discovery of the remains of the town was celebrated under the auspices of the American Geographical Soc. 1889, Nov. 21, at a commemorative tower erected near the junction of Stony brook with Charles river, where the first discovery was made. A tablet let into the tower recites that the region was first seen by Bjorni Herjulfson A.D. 985; that the Charles river was discovered by Leif Erikson A.D. 1000; that it was explored by Leif's brother A.D. 1003; and that the region was colonized by Thorfinn Karlsefni A.D. 1007.—Pop. (1880) 5,426; (1890) 7,073; (1900) 9,706.

WATERTOWN—WATERY GRIPES.

WA'TERTOWN: city, cap. of Jefferson co., N. Y.; on the Black river, and on the Rome Watertown and Ogdensburg railroad; 70 m. s.-by-w. of Ogdensburg, 90 m. n.n.w. of Utica. It is in an agricultural and dairy region; and, owing to the abundant water-power afforded by the river which falls 112 ft. within the city, has become an important manufacturing place. The city is lighted with gas and electricity, is well drained, and has an electric street railroad. There are 20 churches, 9 pub. schools, pub. library, new U. S. govt. building (cost \$75,000), new state armory (cost \$25,000), co. clerk's office (cost \$25,000), soldiers' monument (cost \$10,000). Y.M.C.A. building, Keep Home for Aged People, hospital, and orphans' home. In 1902 there were 5 nat. banks (cap. \$671,240), 1 sav. bank (deposits \$2,150,000), 2 daily, 2 weekly, 3 semi-weekly periodicals. The manufactures comprise portable and stationary steam-engines, wagons, sleighs, locomotive vacuum brakes, lamps, doors, sash and blinds, and other articles. Pop. (1880) 10,697; (1900) 21,696.

WA'TERTOWN: city in Jefferson co., Wis.; on the Rock river, and on the Chicago and Northwestern and the Chicago Milwaukee and St. Paul railroads; 37 m. e.-by-n. of Madison, 43 m. w.-by-n. of Milwaukee. It is in a rich agricultural region, on both sides of the river at its great bend; and contains 13 churches, graded union schools, Northwestern Univ. (Luth.), the College of Our Lady of the Sacred Heart (Rom. Cath.), 1 national bank (cap. \$50,000), 2 state banks, 1 daily and 4 weekly newspapers. The river affords excellent water-power, utilized in manufacture of flour, woolen goods, lumber, sash, doors, and blinds, furniture, cigars, and beer. Pop. (1880) 7,883; (1890) 8,755; (1900) 8,437.

WATERVILLE, *waw'tēr-vīl*: city in Kennebec co., Me., on the Kennebec river, and on the Maine Central railroad; 18 m. n.-by-e. of Augusta, 80 m. n.n.e. of Portland. It derives abundant water-power from the Ticonic Falls, which runs the machine-shops of the railroad and manufactories of woolen goods, machinery, castings, flour, lumber, leather, sash, doors, and blinds, shirts, boot-shanks and other articles. W. is the seat of Colby Univ. (Bapt.), and contains 8 churches, 3 nat. banks, 1 sav. bank, and 3 weekly and 7 monthly periodicals. The Kennebec river is navigable to W., giving it importance as a shipping-point. Pop. (1880) 4,672; (1900) 9,477.

WATER VIOLET: see **HOTTONIA**.

WATER-WORKS: see **WATER-SUPPLY**.

WA'TER YAM: see **LATTICE LEAF**.

WA'TERY GRIPES: popular name for a form of serious diarrhea occurring in infants, in which there are copious discharges, thin and watery, often limpid or almost colorless, and occasionally intermixed with flakes or shreds. This form of diarrhea may be induced in weakly children by sudden impressions of cold on the surface checking perspiration; or it may be brought on by cold drinks when the body is heated. The exhaustion by the copious excre-

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tions from the bowels is sometimes so great that the case might be mistaken for one of cholera. The child thus attacked should at once be wrapped in warm flannel, placed in bed, with a bag of hot dry bran over the belly; and some arrowroot, with a little brandy, given frequently in teaspoonfuls or larger doses according to age; and a physician should be at once sent for. If medical aid cannot be readily procured, opium must be carefully used to check the evacuations: one of the best preparations is aromatic powder of chalk and opium, every 40 grains of which contain 1 grain of opium. From 3 to 5 grains of this powder, with a quarter of a grain of ipecacuanha, may be given, and repeated every three or four hours for two or three times, unless any head-symptoms (due to the opium) are perceived.

WATFORD, *wõt'fêrd*: market-town, county of Hertford, England; on the banks of the Colne; 18 m. n.w. of London by rail. Straw-plait is manufactured, and silk-spinning and malting are carried on; and there are two large paper-mills. Pop. (1881) 10,073; (1891) 10,300.

WATKINS, *wõt'kînz*: village, cap. of Schuyler co., N. Y.; at the s. end of Seneca Lake; 22 m. n. of Elmira, 76 m. s.s.e. of Rochester. It contains 5 churches, Watkins Acad., 2 public libraries, 6 hotels, several iron foundries, steam flour-mills, tannery, boot and shoe factories, and 3 weekly newspapers. It is in an agricultural and grape-growing region, and has regular steamboat connection with Geneva in all seasons of the year.—Near it is the famous Watkins Glen, a deep, picturesque ravine extending several m. from the head of the lake, and containing numerous cascades, some with a fall of 60 ft., and a series of rocky arcades, galleries, and grottoes. The principal attractions are Rainbow Falls, the Cathedral, Glen Alpha, and the Well. The scenery is unusually romantic, and the Glen is visited by many thousand people every season.—Pop. of village including Readingtown (1880) 1,919; (1890) 1,669; (1900) 2,943.

WATKINS, SAMUEL: 1794–1880, Oct. 16; b. Campbell co., Va. His parents died when he was an infant, and his early life was one of abuses and hardships. After working on a plantation for several years, he entered the U. S. army and served under Gen. Jackson against the Creek Indians and in the battle of New Orleans. After peace was declared he settled at Nashville, Tenn., and became a brick-mason, and subsequently a master-builder, and wealthy; but much of his property was destroyed in the civil war, his farm of 600 acres being the battle-field of Nashville. After the war he engaged in banking, manufacturing, and other pursuits, and acquired a large fortune, of which he gave liberally for educational purposes. He bequeathed \$130,000 for a polytechnic institute at Nashville, erected 1882, and provided for the establishing of courses of free public lectures, and classes in mathematics, for those without the advantages of schools and colleges. He died at Nashville.

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WATKINSON, *wŏt'kĭn-son*, **DAVID**: philanthropist: 1778, Jan. 17—1857, Dec. 13; b. Lavenham, Suffolk, Eng. His early education was directed by the famous Mrs. Barbauld; but when 17 years of age he removed with his parents to this country, and settled at Middletown, Conn. He received a commercial training in a counting-house in New York, and in 1800, in partnership with his brother William, engaged in mercantile business in Hartford, Conn. In 1841 he retired with a large fortune. He bequeathed \$40,000 to the Hartford Hospital, \$20,000 to its orphan asylum, \$40,000 toward establishing a juvenile asylum and farm-school for waifs, and \$100,000 to the Conn. Historical Soc. for a reference library in Hartford, called the Watkinson Library. He died at Hartford.

WATLING'S ISLAND, *wŏt'lingz*: small island of the Bahama group (see **BAHAMAS**), now believed to be the true island of San Salvador (q. v.), which was the first American land seen by Columbus. Cat Island or Guanahani was till recent years regarded as the memorable island of San Salvador. W. I. is a few miles east of the s. end of Cat Island.

WATLING STREET, *wŏt'ling strĕt*: one of the great Roman highways of Britain, beginning at Dover, passing through Canterbury and Rochester to London, thence through Uriconium and Chester to Caer-Seiont, the anc. *Segontium*, in Caernarvonshire. From Uriconium a branch proceeded n. by Manchester, Lancaster, and Kendal, into Scotland. Traces of the ancient road are still visible in many parts of its course, and in some it is still an important highway. A street in London retains its name. The origin of this name is uncertain; the most probable supposition is that the original name was *Stratum Vitellianum*.

WATSON, *wŏt'son*, **ELKANAH**: projector and promoter of public improvements: 1758, Jan. 22—1842, Dec. 5; b. Plymouth, Mass. He was serving as apprentice in a mercantile business in Providence, R. I., when Gen. Washington took command of the army around Boston; and W. took charge of transporting to Cambridge, Mass., 1½ tons of gunpowder. He made a tour of 'mercantile prospecting' among the seaboard cities of the southern states 1777; his journal of the tour, which he published, is the best contemporary evidence as to the condition of the principal towns of that region at that date. He was bearer of dispatches to Benjamin Franklin in Paris 1779, and thereafter for 3 years was engaged in mercantile business at Nantes; then spent some time in England, Holland, and Flanders, returning to Newport, R. I., 1784. He visited Washington at Mt. Vernon, and there spent 'two days, the richest of my life;' their discourse was chiefly of improving the navigation of the Potomac. The next few years he was engaged in trade between Charleston, S. C., and Hayti. He settled in Albany, N. Y., 1789, and there labored to promote many enterprises of great general utility—e.g., improvement of the navigation of the Hudson, a great canal from the Hudson to Lake Erie, stage routes

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to the west, advancement of education and agriculture, paving of the streets of Albany. He published an account of a tour of the state of N. Y., made while exploring routes for projected canals. He settled at Pittsfield, Mass., as a farmer 1807, and there founded the Berkshire Agricultural Soc. Returning to Albany 1816, he organized an agricultural soc. there—the first in the state of N. Y. From 1828 till his death he studied and practiced scientific agriculture at Port Kent, N. Y. He published, besides the journals of travel above mentioned, a journal of a *Tour in Holland* (1790); *Hist. of the Rise, Progress, etc., of the Canals in the State of N. Y.* (1820); *Rise, Progress, etc., of Agricultural Societies* (1820); and many pamphlets and contributions to periodicals. See *Men and Times of the Revolution, or Memoirs of Elkanah W.*, containing his journals and correspondence edited by Winslow C. Watson (New York, 2d ed. 1856).

WATSON, JAMES CRAIG, PH.D., LL.D.: astronomer 1838, Jan. 28—1880, Nov. 23; b. Fingal, Canada; son of parents both natives of the United States. He graduated at Michigan Univ. 1857. Having made a special study of astronomy and become familiar with details of observatory work, he was appointed assistant in the observatory at graduation, and, 1859, asst. prof. of astronomy; he was prof. of physics 1860, but returned to the dept. of astronomy 1863, as director of the observatory; became prof. of astronomy and director of the observatory in the Univ. of Wisconsin 1879. While still an undergraduate at Ann Arbor, W. discovered a comet, and the year of his graduation, 1857, Oct. 20, discovered independently an asteroid found a few days earlier by another observer. He computed the elements of Donati's comet 1858, and his results are regarded by astronomers as authoritative. His discoveries of planetoids, asteroids, or minor planets are very numerous: in one year (1868) W. added to the list of such bodies Hecate, Helena, Hera, Clymene, Artemis, and Dione. He was attached to a govt. expedition for observing the sun's eclipse 1869 in Iowa and 1870 in Sicily; accompanied the govt. transit of Venus expedition to China 1874; was in charge of an expedition to observe in Wyoming the total eclipse of the sun 1878. Besides articles in periodicals, W. pub. a *Popular Treatise on Comets* (1860); *Theoretical Astronomy* (1868); *Tables for Calculating Interest* (1879).

WATSON, JOHN, D.D. (pen-name, IAN MACLAREN): British author; b. 1850, Nov. 3, at Manningtree, Essex, Eng. He is of Scotch ancestry on both father's and mother's side. At the time of the author's birth his father was an officer of excise in Essex, Eng., whence he soon removed to London, where he remained several years; but the forming years of the son's childhood were spent in Scotland, first at Perth, later at Stirling, with summer visits to two uncles who were farmers at Blairgowrie and Meikle. His father was an elder in the Free Church of Scotland. W. studied at Edinburgh Univ., then at New College, Edinburgh, and became a minister of the Free Church, settled first at Logie-almond, Perthshire—the 'Drumtochty' of his stories,—

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then at Glasgow, and later at Sefton Park Presb. Ch., Liverpool, where he still remains. In 1894 he issued the series of Scotch stories called *The Bonnie Brier Bush*, followed by *Days of Auld Lang Syne*, *Kate Carnegie*, and other tales and sketches. He has also published some distinctively religious writings. In the autumn of 1896 he visited America, to deliver at Yale Univ. the Lyman Beecher course of lectures on preaching, since published under the title *The Cure of Souls*. On the same visit he gave readings from his stories in many cities of the United States and Canada.

WATSON, RICHARD: Methodist minister: 1781, Feb. 22—1833, Jan. 8; b. Barton-upon-Humber, Lincolnshire, Eng. At 14 years of age he was apprenticed to a carpenter, but had previously learned considerable Latin and Greek. When 15 years old he became a Methodist, and was licensed by the church to preach. He was released from his apprenticeship, was ordained at 19, and devoted the rest of his life to fervent labor as a preacher, and diligent authorship in behalf of the doctrines of his church. In 1800 he published *Apology for the People called Methodists*. He was for some time editor of the *Liverpool Courier*; was author of *Theological Institutes*, *The Life of John Wesley*, *A Biblical and Theological Dictionary*, and *An Exposition of the Gospels of Matthew and Mark*. His *Institutes* and *Dictionary* are authorities in the Methodist Church. He died in London.

WATSON, RICHARD, D.D.: bishop of the Church of England: 1737—1816, July 2; b. Heversham, Westmoreland. He was educated at Cambridge, where he became prof. of chemistry 1764: when appointed he knew almost nothing of the science, but in a few months became proficient. In 1771 he became regius prof. of divinity—a subject which he had not till then very diligently studied; and was soon known as an ingenious, eloquent, and copious author of theological works. He obtained several livings, was archdeacon of Ely, and 1782 became bp. of Llandaff. Besides innumerable sermons, addresses, essays, and charges, he published a famous *Apology for Christianity, in a series of Letters addressed to Edward Gibbon, Esq.* (1776); *An Apology for the Bible* (1796). His liberal sentiments in matters civil and ecclesiastical caused his orthodoxy to be questioned by some in his lifetime. His autobiography, *Anecdotes of the Life of Richard W.*, was pub. by his son 1817.

WATSON, THOMAS E.: politician and journalist: 1856, Sept. 5— — — — —; b. Columbia co., Ga. After receiving a common-school education, he studied at Mercer Univ., at Macon; leaving college for lack of funds in his sophomore year, he supported himself for several years by teaching school, studying law in the mean time. He was admitted to practice 1876, and opened an office in Thomson. He served in the Ga. legislature 1882—3. In 1890 he was elected to congress as a democrat, and was defeated twice afterward as a populist. In the presidential campaign of 1892 W. published a book in which he made grave charges against the character and qualifications of members of the U. S. house of representatives, alleging that many of them

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were drunken, extravagant with public funds, etc. A committee of the house was appointed to investigate the charges, which were not sustained. At the national nominating convention of the People's party held in St. Louis, Mo., 1896, July 22–25, resulting in the nomination of William J. Bryan (who was also the nominee of the democratic national convention at Chicago) for the presidency, W. was nominated for vice-president. He was not elected: see PRESIDENT AND VICE PRESIDENT, ELECTION OF.

WATSON, WILLIAM: English poet: 1855— ————; b. Wharfedale, Yorkshire. On account of delicate health in youth, he was privately educated. His first poems appeared 1876 in the *Liverpool Argus*, followed by a volume in 1880 which attracted no attention; but *Wordsworth's Grave*, a poem published 1892, placed his name high in the list of the younger British poets, and in the same year he published a poem on Tennyson which brought him a pension of £200. A series of sonnets called *The Purple East* (1896), attacking the government for its dilatoriness in protecting the Armenians from the cruelty of the Sultan, enhanced his fame. Among his books are: *Lachrymæ Musarum*; *Epigrams of Art, Life, and Nature*; *The Eloping Angels*; *Odes, and other Poems*; etc.

WATT: see UNITS, SCIENTIFIC.

WATT, *wõt*, JAMES, LL.D.: mechanician, engineer, and man of science, famous as improver and almost inventor of the steam-engine: 1736, Jan. 19—1819, Aug. 19; b. Greenock, Scotland. His father was a general merchant at Greenock, and for a time a magistrate.

James W. was weakly as a child, and unable to go to school with regularity. He early showed a turn for mathematics and calculations, and great interest in machines: accordingly, as his father's business had greatly declined, he was, at the age of 18, sent to London, to learn the trade of a mathematical instrument maker. Ill health compelled his return about a year afterward; but he had made good use of his opportunities in London; and he resolved to set up as a mathematical instrument maker in Glasgow. The incorporation of hammermen of that city put difficulties in his way; but the authorities of the university appointed him mathematical instrument maker to the university, and gave him the use of premises within their precincts 1757–63. He had to eke out his income by making or mending fiddles (though he had no ear for music), or doing any mechanical job which came in his way; and no work requiring ingenuity or application of scientific knowledge seems to have come amiss to him. In 1767 he was employed to make the surveys and prepare the estimates for a canal projected to unite the Forth and the Clyde: thus he made a beginning as a civil engineer. He made surveys for various canals, for improvement of the harbors of Ayr, Port Glasgow, and Greenock, and for deepening of the Forth, the Clyde, and other rivers. In his surveys he made use of a new micrometer, and of a machine, also of his own invention, for drawing in perspective—the latter of which appears to have been for several years about this time one of his sources of income.

While living in the college at Glasgow, in constant intercourse with the professors of the univ., with access to books, and with much unemployed time on his hands—having, too, a great love of knowledge, and a lively interest in mechanical novelties—W. had been a diligent experimenter in the application of science to the arts. In the winter of 1763–4 he began the investigations which ended in his improvement of the steam-engine. A working model of the Newcomen engine, kept for the use of the natural philosophy class in the college, was sent to him for repair, which W. quickly effected. But in doing this he became greatly impressed with the defects of the machine. The Newcomen engine (see STEAM-ENGINE) was still but little used, and only for pumping water out of mines. It was cumbersome, and it required so much fuel that its expense must always have restricted its use. It was not properly a steam-engine: it was worked by the atmospheric pressure; steam being used only in producing, by its condensation, a vacuum in a cylinder, into which—the vacuum made—a piston was depressed by the pressure of the air. The steam issuing from a boiler was admitted into the cylinder until it filled it, when the supply was cut off by a self-acting cock; and then the steam was condensed in the cylinder by means of a jet of water. The water so greatly cooled the cylinder that the greater part of the steam at each stroke of the piston was wasted in heating its walls; and, on the other hand, much of the injected water was heated to the boiling-point, and gave off steam, which resisted the descent of the piston. W. found that about four-fifths of the steam, and consequently of the fuel, was wasted; and he saw that to make the machine work economically two apparently incompatible conditions must be obtained—first, that the walls of the cylinder must constantly be of the same temperature as the steam which came in contact with them; second, that the injected water must never be heated up to 100° , the boiling-point *in vacuo*. He experimented on the conducting power of various substances, and made trial of a cylinder of wood steeped in oil; but with this cylinder, though it cooled less rapidly than a metallic one, there was still great waste of steam. Constantly, from the end of 1763, occupied with the subject of steam, he at length, early in 1765, hit on the expedient which solved all his difficulties—the separate condenser, an air-exhausted vessel, into which the steam should be admitted from the cylinder, and there condensed. The separate condenser at once prevented the loss of steam in the cylinder which had arisen in the process of condensation; and there was no difficulty in keeping it cool, so as to prevent the undue heating of the injection-water. He had now a thoroughly economical engine on Newcomen's principle, but he did not rest content with this—he resolved to make steam his motive-power. Closing the cylinder at both top and bottom, and connecting the piston with the beam, to which it was to communicate motion, by a piston-rod passing through a stuffing-box, he admitted the steam by suitable valves alternately above

and below the piston, to push it downward and upward in turn; and this done, his invention was substantially complete. He had at last made a real steam engine, capable of being worked with a comparatively small expenditure of fuel, and of yielding any desired amount of power. Comparing his invention with the atmospheric engine of Newcomen, shows why the popular voice has awarded him the name of inventor of the steam-engine.

In 1773 W. formed a partnership with Matthew Boulton of Soho, near Birmingham, and the manufacture of the new engine was commenced at the Soho Iron Works. A patent for his invention had been taken by W. 1769; and he got from parliament 1775 a prolongation of his patent for 25 years.

The new engine soon superseded Newcomen's machine as a pumping-engine. W. afterward made numerous improvements in its construction (for the most important of which, see STEAM-ENGINE); and, with his partner Boulton, he immensely improved the quality of the workmanship in building engines and other machines. In 1781, 82, 84, 85, he obtained patents for a series of inventions—among them, the sun and planet motion, the expansive principle, the double engine, the parallel motion, and the smokeless furnace, of most of which the chief purpose was to make steam-pressure available for turning machinery in mills. The accomplishment of this—extending the application of the new power to the arts—was of scarcely inferior importance to the invention of the steam-engine itself. The first contrivance invented by W. for this purpose was lost to him through the treachery of a mechanic who had been employed in making the model, who sold it to a manufacturer named Prickards, who got a patent for it for himself. The application to the steam-engine of the governor (see STEAM-ENGINE) was W.'s crowning improvement. He made numerous inventions unconnected with the steam-engine.

He retired 1800, giving up to his two sons his interest in the extensive and prosperous business which Boulton had created at Soho. He died at Heathfield Hall in Staffordshire, in his 84th year. W. had extensive and accurate knowledge of the physical sciences—to several of which he made important contributions—and an almost unsurpassed fund of general information. (For his claims to be considered the discoverer of the composition of water, see WATER.) He was elected a fellow of the Royal Soc. of Edinburgh 1784; a fellow of the Royal Soc. of London in 1785; and afterward a member of the Institute of France.—W. was a man of much modesty and warmth of heart.

WATTEAU, *vâ-tô'*, ANTOINE: French painter: 1684–1721, July 18; b. Valenciennes. In 1702 he went as a poor boy to Paris, and worked as assistant to a painter of saints for rural customers. When this employment failed him, by the retirement of his master from Paris, he took a place in the studio of Gillot, a popular painter of the day. From Gillot he passed to Audran, then decorating the Luxembourg; but left him through some disagreement—producing

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about this time his first two pictures, *Departing Regiment*, and *Regiment Halting*. In 1709 he stood second in the competition for the great prize: his success was assured; he was made a member of the French Acad. 1717, and became by special favor *Peintre des Fêtes Galantes du Roi*. In 1718 he visited England, remaining about a year.

In virtue of their charming color and graceful design, the pictures of W. continue to please, though his reputation as an artist is far less than in his lifetime. He employed himself chiefly in painting small landscapes with something of the nature of the *Fête Galante* going on in them—idyls in court-dress, which, as preserving for us the fopperies of the time, have a value besides that of their artistic brilliancy.

WATTERSON, *wŏt'ér-son*, HENRY: journalist: b. Washington, D. C., 1840, Feb. 16; son of Harvey McGee W., lawyer and journalist. He entered the journalistic profession in Washington 1858; became editor of a newspaper in Nashville, Tenn., 1861; was in the Confederate army as staff-officer and chief of scouts 1861–63. He then resuscitated his newspaper, *Republican Banner*; succeeded George D. Prentice as editor of the Louisville, Ky., *Journal*, 1867, and on consolidation of that paper with two others, *Courier* and *Times*, became editor of the *Courier-Journal*. He was representative in congress 1876, Aug. 12—1877, Mar. 3, was delegate from Ky. in several national conventions of the democratic party, and presided over the convention at St. Louis 1876. As editor of the *Courier-Journal* W. has been a very influential leader in his party. His public speeches are infrequent, but they always win the attention of the people and of politicians throughout the country by their brilliancy and originality.

WATTLE, n. *wŏt' tl* [AS. *watul*, *watel*, a hurdle or covering: Bav. *wadel*, fir-branches, twigs: the primary sense, according to Skeat, is something woven, hence a hurdle, a bag of woven stuff]: a twig or flexible rod; a hurdle made of flexible rods; the fleshy excrescence under the head of a cock or turkey; the like substance on a fish; a name applied in Australia to various species of *Acacia* (q.v.): V. to bind with twigs; to twist or interweave, as twigs with one another. WATTLING, imp. *-tlīng*. WATTLED, pp. *wŏt' tld*: ADJ. having wattles, as a cock or turkey.

WATTLE-BIRD, *wŏt' tl-bérd* (*Anthochaera carunculata*): Australian bird, of family *Meliphagidæ* or Honey-eaters. It is about the size of a magpie, grayish brown above, each feather striped and bordered with white; the tail brown, long, wide, and graduated. It derives its name from a pendulous reddish wattle on each side of the throat. It feeds chiefly on honey and insects extracted from the flowers of *Banksias*—trees continuing in flower most of the year. It is a bold and active bird, and drives away all other birds from the part of the tree which it occupies.

WATTS, *wŏtz*, FREDERICK: lawyer: 1801, May 9—1889, Aug. 17; b. Carlisle, Penn. He graduated at Dickinson College 1819, studied law, and was admitted to the bar

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1824; 1831 appointed supreme-court reporter; 1845 elected pres. of the Cumberland Valley railroad; 1849 commissioned president-judge of the 9th judicial dist. of Penn.; 1871 appointed commissioner of agriculture, serving in this position until 1877, when he resumed his law practice at Carlisle. As court reporter he edited the supreme-court reports 1832-40 and 1841-45.

WATTS, GEORGE FREDERICK: artist painter: b. London, England, 1820. His cartoon *Caractacus led in Triumph through the Streets of Rome* took a prize of £300 (1843). He then studied his art in Italy three years; and won the highest honor and £500 in a competition at Westminster Hall, 1847, with his colossal oil-paintings *Echo* and *Alfred inciting the Saxons to prevent the Landing of the Danes*. He exhibited (1848) *Paolo and Francesca*, and *Orlando pursuing the Fata Morgana*; *Life's Illusions* (1849); *The Good Samaritan* (1850). W. executed some colossal figures and groups in the decoration of the houses of parliament 1853. His principal works are portraits and ideal or mythological subjects. He made a portrait of Tennyson 1890. His ideal pictures half reveal some mystic meaning which seems to gleam through a startling glow of color.

WATTS, HENRY: English chemist: 1815, Jan. 20—1884, June 30; b. London. He graduated at University College, London, 1841. In 1848 he began the translation of Gmelin's *Handbook of Chemistry* (18 vols.), on which he was engaged for 20 years; but his best-known work is his *Dictionary of Chemistry* (5 vols.), completed 1868, to which he added several supplementary vols. He died in London.

WATTS, ISAAC, D.D.: English Independent minister and hymn-writer: 1674, July 17—1748, Nov. 25; b. Southampton, where his father had a boarding-school. He is said to have begun the study of the classics in his 5th year, and to have composed devotional hymns at the age of 7 or 8. He was educated at the grammar school of his native place, and sent at the age of 16 to an acad. in London, kept by the Rev. Thomas Rowe, an Independent minister. Here his devotion to his studies was so excessive as to permanently injure his constitution. In 1696 he became tutor in the family of Sir John Hartopp, at Stoke-Newington, with whom he remained six years. During the latter part of this time he officiated as assistant to Dr. Chauncey, minister of the Independent church in Mark Lane, to whose post he succeeded 1702. His health was throughout infirm; and in 1712 he was prostrated by an illness so violent that he never thoroughly recovered from its effects, though he lived many years afterward. A visit which he paid to Sir Thomas Abney, at Theobalds, for change of air, resulted in his domestication in the establishment till his death, 36 years afterward. As his health permitted, he continued to discharge his clerical duties, and to occupy himself with literary pursuits. Though Dr. W. was of a fervent evangelical spirit—as his hymns show—his religious opinions were unusually liberal. His theological works were numerous, but are now quite forgotten. His

WATTS—WAT TYLER INSURRECTION.

treatise on *Logic*, long since superseded, had in its day high reputation, and was adopted as a text-book by the Univ. of Oxford. Dr. W. was probably the chief of the founders of modern Eng. hymnody. His style is often faulty; but in a large portion of his work he shows fine fervor, nervous strength, and graceful simplicity. Discarding the mass of inferior work, we find more of his hymns that are fitted for congregational use than in the compositions of any other writer. So lately as 1837 his *Horæ Lyricæ* were republished, with a Memoir by Southey: his other poetical works were: *Hymns and Spiritual Songs; Psalms of David in the Language of the New Testament; Divine and Moral Songs for Children*. See Johnson's *Lives of the Poets*.

WATTS, THOMAS: English philologist and librarian: b. early in the 19th c.; d. 1869, Apr. 9. At school he studied Latin, French, and Greek; distinguished himself by his attainments in English; read every book that came in his way; and wrote, apparently with ease, tales, essays, and poetry above the average of the magazine-writing of the day. W. soon added an acquaintance with Italian, Spanish, and Portuguese; likewise with German, Dutch, Swedish, Danish, and Icelandic. Later he made some progress in Hebrew, Arabic, Persian, Turkish, and even Chinese; but did not master them as he did those languages before named, and as he subsequently mastered Russian, Polish, and Hungarian, which three languages W. could read and translate with ease. He was well acquainted with the Welsh language and literature, and had some knowledge of Gaelic and Irish. In 1838 W. was engaged as an assistant in the department of Printed Books in the Brit. Museum (q.v.); 1857 was appointed supt. of the splendid new reading-room; 1866, keeper of the department of Printed Books. Through nearly all these years the purchases for the library were largely at his suggestion; and the classification and arrangement of volumes was in part on an 'elastic system' devised by him. W. was a member of the Philological Soc. of London. Among his literary productions are: 'Notes of a Reader,' contributed to a weekly periodical entitled *The Spirit of Literature* (1830); *A Sketch of the History of the Welsh Language and Literature* (reprinted from Knight's *English Cyclopædia*) (1839); more than a hundred biographies of eminent men, Russian, Hungarian, Bohemian, etc., contributed to the same *Cyclopædia*; numerous articles in the *Biographical Dictionary* of the Soc. for Diffusion of Useful Knowledge; papers in the *Transactions of the Philological Soc.*; also contributions to the *Quarterly Review*, the *Athenæum*, and other periodicals.

WAT TYLER INSURRECTION: insurrection in England, excited by a poll-tax of three groats, imposed 1381, during Richard II.'s minority, to defray the expenses of the war with France. An insult offered by one of the tax-gatherers to a blacksmith's daughter in Essex led to the first outbreak. The populace rose in many places; and under the conduct of two peasants, Wat Tyler and Jack Straw, they mustered in great force at Blackheath, committing violence on all who came into their hands. They

WAUKEGAN—WAUSAU.

had an interview with the king, who, finding resistance vain, promised acquiescence with their demands, which included a general pardon, freedom of commerce, and abolition of villeinage. Meantime a party of insurgents had broken into the Tower, and murdered the primate and chancellor and the treasurer. The king, encountering Tyler at the head of the rioters in Smithfield, invited him to a conference, when he conducted himself with an insolence that led Walworth, the mayor, to dispatch him with a dagger. The king immediately, with great presence of mind, offered himself to head the populace; and leading them to the fields at Islington, where a body of troops had been collected for his majesty's protection, ordered the rioters to disperse. The revolt, however, was not extinguished without considerable bloodshed.

WAUKEGAN, *waw-kē'gan*: city, cap. of Lake co., Ill.; on Lake Michigan, and on the Chicago and Northwestern and the Elgin Joliet and Eastern railroads; 35 m. n.-by-w. of Chicago, 50 m. s. of Milwaukee. It is on a bluff 80 ft. above the lake, with an intervening beach, and is noted for its salubrity, many mineral springs, and manufactures, besides being a favorite place of summer residence for many Chicago families. There are 10 churches, public park, St. Alberta's Acad., commercial college, artesian water-works, 1 national bank (cap. \$50,000), 1 state bank (cap. \$50,000), and several newspapers. The industries include manufactures of agricultural implements, pumps, scales, wagons and carriages, machinery, foundry products, leather, woolen goods, and beer. Pop. (1880) 4,012; (1900) 9,426.

WAUKESHA, *waw'kē-shaw*: town, cap. of Waukesha co., Wis.; on the Fox river, and on the Chicago Milwaukee and St. Paul, the Chicago and Northwestern, and the Wisconsin Central railroads; 20 m. w. of Milwaukee. It is in the richest agricultural section of the state, and from its location on the river, and the presence of 10 mineral springs of high medicinal repute, has become known as the 'Saratoga of the west.' It is beautifully laid out and ornamented, and contains 9 churches, the state industrial school for boys, Carroll College, stone court-house, lime and stone quarries, 2 national banks (cap. \$200,000), 3 weekly newspapers, railroad car-shops, and several manufactories.—Pop. (1880) 2,969; (1890) 6,321; (1900) 7,419.

WAUL, v. *wawol* [a word imitative of the cry]: to cry as a cat: N. the cry of a cat.

WAUR, a. *wawor*: in *Scot.*, worse.

WAUSAU, *waw'saw*: city, cap. of Marathon co., Wis.; on the Wisconsin river, and on the Chicago Milwaukee and St. Paul and the Chicago Milwaukee and Lake Shore railroads; 20 m. n.w. of Milwaukee. It is in an agricultural and lumbering region; has excellent water-power; contains 19 churches, graded schools, 1 national bank, (cap. \$100,000), 2 state banks (cap. \$135,000), and 4 weekly and 1 monthly periodicals; and carries on a large business in manufacturing, lumbering and granite quarrying. Pop. (1880) 4,277; (1890) 9,253; (1900) 12,354.

WAVE.

WAVE, n. *wāv* [OE. *wawe*; AS. *wæg*; Ger. *woge*; Dan. *vove*; Icel. *vágr*, a billow, a wave: Ger. *wehen*, to wave, float, hover: OHG. *wegan*, to move, to vibrate: Icel. *vafra*, *vafla*, to waver]: a surface disturbance consisting of the alternate rising and falling of water or the like, above and below its natural level; a moving swell or volume of water; a billow; any motion or appearance resembling that of a wave; any physical vibration, as *waves* of sound, etc. (see below); a waving gesture or motion, as of the hand, a sword, or the like: with definite article, *the wave* or *the waves*, the sea; the ocean: V. to move to and fro or up and down; to undulate: to give a wavy form to; to decorate with waves or wavy lines; to direct by a waving motion; to beckon; in OE., to waver. **WA'VING**, imp. a moving to and fro: N. the act of moving as a wave; the act of moving to and fro. **WAVED**, pp. *wāvd*: **ADJ.** variegated in lustre. **WAVE-LIKE**, resembling a wave. **WAVE'LESS**, a. *-lēś*, without waves; undisturbed. **WAVY**, a. *wā'vī*, that plays to and fro, as waves; full of waves; undulating in movement or form. **WA'VINESS**, n. the state or quality of being wavy or undulating. **WAVE'LET**, n. *-lēt*, a small wave; a ripple on water. **WAVE-OFFERING**, in the *Jewish worship*, an offering made by the priest holding aloft and *waving* the thing offered toward heaven as a symbol of its presentation to Jehovah. **WAVESON**, n. *wāv'sūn*, goods which appear floating on the sea, as after a shipwreck. **WAVE-WORN**, a. worn by the waves.

WAVE, v. *wāv*: a form of **WAIVE** (q.v.).

WAVE: *state of disturbance*, consisting of alternate elevations and depressions propagated from one set of particles of a medium to the adjoining set, and so on; sometimes with, sometimes without, a small permanent displacement of these particles. But the essential characteristic is, that energy (see **FORCE**), not Matter (q.v.), is on the whole transferred. The theory of wave-motion is of the utmost importance in physical science; since, besides the tide-wave, waves in the sea, in ponds, or in canals, undulations in a stretched cord (such as a piano-forte wire), or in a solid (as sound-waves or earthquake-waves), we know that sounds in air are propagated as waves (see **SOUND**), and that even light (see **UNDULATORY THEORY**) is a form of wave-motion.

The general investigation of the form and rate of propagation of waves demands the application of the highest resources of mathematics; and the theory of even such comparatively simple cases as the wind-waves in deep water (the Atlantic roll, for instance), though easily enough treated to a first and even to a second and third approximation, has not yet been thoroughly worked out, as fluid friction has not been taken account of. In this article, therefore, we merely *state* some of the more important conclusions which mathematical analysis has established in the more difficult of these inquiries, comparing them with the observations of Scott Russell and others; while we give at full length the very simple investigations

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of the motion of a wave along a stretched cord, and of the propagation of a particular kind of sound-wave.

To find the rate at which an undulation runs along a stretched cord—e.g., when a harp-string is sharply struck or plucked near one end—a very simple investigation suffices. Suppose a uniform cord to be stretched with a given tension in a smooth tube of any form whatever, we may easily show that there is a certain velocity with which the cord must be drawn through the tube in order *to cease to press on it at any point*—that is, to move independently of the tube altogether; for the pressure on the tube is due to the tension of the cord, and is relieved by the so-called Centrifugal Force (see CENTRAL FORCES) when the cord is in motion.

If T be the tension of the cord, r the radius of curvature of the tube at any point, the pressure on the tube per unit of length is

$$\frac{T}{r}.$$

If m be the mass of unit length of the cord, v its velocity, the centrifugal force is

$$\frac{mv^2}{r}.$$

These are equal in magnitude, and so destroy each other, if

$$T = mv^2.$$

Hence, if the cord be pulled through the tube with the velocity thus determined, there will be no pressure on the tube, and *it may therefore be dispensed with*. If we suppose the tube to have a form such as that in the figure, where the extreme portions are in one straight line, the cord will



Fig. 1.

appear to be drawn, with velocity v , along this, the curved part being occupied by each portion of the cord in succession—presenting something like the appearance of a row of sheep, in Indian file, jumping over a hedge.

To a spectator moving in the direction of the arrow with velocity v , the straight parts of the cord will appear to be at rest, while an undulation of *any* definite form and size whatever runs along it with velocity v , in the opposite direction. This is a very singular case, and illustrates in a very clear manner the possibility of the propagation of a *solitary* wave.

Thus we have proved that the velocity with which an undulation runs along such a cord is

$$\sqrt{\frac{T}{m}}$$

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If l be the length of the cord in feet, w its whole weight, W the appended weight by which it is stretched, $g = 32.2$ ft., the measure of the earth's gravity, this becomes

$$\sqrt{\frac{W}{w}lg}.$$

This formula is found to agree almost exactly with the results of experiment. We can easily see why it should be to a small extent incorrect, because we have supposed the cord inextensible and perfectly flexible, which it cannot be; and we have neglected the effects of extraneous forces, e.g., gravity, resistance of the air, etc.

Consider next the motion of air in a cylindrical tube, in the particular case in which the leg of a vibrating tuning-fork is applied at one end. This is a simple case of the propagation of sound-waves: we treat it by a synthetical process, somewhat like that given by Newton.

It has been shown (see PENDULUM) that a simple vibration such as that of a pendulum or tuning-fork is the resolved part, in a definite line, of the uniform motion of a point in the circumference of a circle. What we have now to show is, that such a motion of all the particles of air in the pipe, the *phase* of the vibration (or the position of the particle in its path at any instant) depending on its distance from the end of the tube, is consistent with mechanical principles. When this is done, it will be easy for us to trace, in this particular example, the process by which the wave is propagated from one layer of the fluid to the next. We must now consider (a little more closely than in PENDULUM or SOUND) the nature of the simple vibration of each particle of the air.

Suppose P to move, with uniform velocity V , in the circle APB , and let PQ be drawn perpendicular to the fixed diameter OA . Then the acceleration of P 's motion is $\frac{V^2}{OA}$ in the direction PO . Hence in the motion of Q , which is a simple vibration, we have, by the rule for resolving velocities and accelerations (see VELOCITY),

$$\text{Velocity of } Q = \frac{PQ}{OA}V \text{ in the direction } QO;$$

$$\text{Acceleration of } Q = \frac{OQ}{OA} \frac{V^2}{OA} \text{ in the direction } QO.$$

Next consider two particles of air near one another in the axis of the tube, or the masses of air in two contiguous cross-sections of the tube. If the phase of vibration were the same for both, they would be *equally* displaced from their original positions, and the air between them would be neither compressed nor dilated. Hence, that a wave may pass, the phases must be different. Let, then, Q represent the position of the one particle, or layer, in its line of vibration at any instant; Q' , the simultaneous position of the other. The first will be displaced through a space OQ from its position of rest; the second, through a space OQ' ; and their distance will therefore be altered by the

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amount QQ' , which may be taken to represent the compression or dilatation. But it is easy to see that, as P and P' move round, QQ' is always proportional to PQ . Hence the compression or dilatation of the air in any cross-section of the tube is proportional to the velocity with which it is moving. Hence the difference of pressures before and behind any such section is proportional to the difference of velocities—i.e., to the acceleration of the motion while the section passes over a space equal to its own thickness. And this is consistent with mechanical principles, for the *mass* of air in the section is constant, while the difference of pressures before and behind produces the acceleration, and should therefore be proportional to it. The particles of air in cross-sections of the tube therefore vibrate, each in the same period as does the tuning-fork, but the phase is *later* for each section in proportion to its distance from the fork. Where the phase is one or more whole vibrations later than that of the fork, the motion is exactly the same as that of the fork, and *simultaneous* with it. At all other points it is the same as that of the fork, but not simultaneous. Thus the greatest displacement of the fork is immediately shared by the layer next it, later by the next layer, and so on. Thus a *wave* of displacement travels along the tube from one section to the next, while each particle merely oscillates forward and backward through (in general) a very small space about its position of rest.

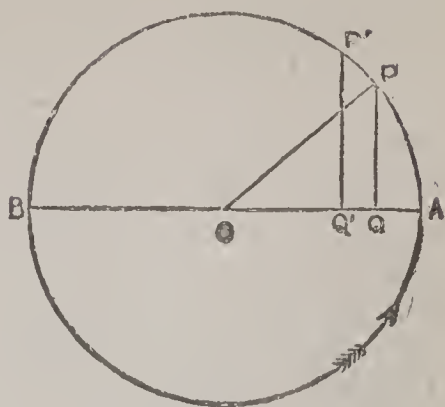


Fig. 2.

The reader who has followed the little geometrical investigation above will have no difficulty in proving for himself that the velocity with which the wave travels is proportional to

$$\sqrt{\frac{p}{\rho}},$$

where p is the pressure, and ρ the density of the air. The easiest mode of doing this is to express, in terms of these and other quantities, the equation given us by the laws of motion,

Mass \times Acceleration = Difference of pressures,

and to assume that Hooke's (q.v.) Law holds, even during the *sudden* compression of air. This, we know, is not the case; so that a correction has to be applied to the above expression, depending on the heat developed by sudden compression or lost in sudden rarefaction, by each of which the elastic force of the air is *increased*: sec SOUND.

The above formula shows us, however, that the velocity of sound is not affected by the pressure of the air—i.e., the height of the barometer—since, in still air, p is *proportional* to ρ . The velocity does depend on the temperature, being,

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in fact, proportional (*cæteris paribus*) to the square root of the temperature measured from absolute zero: see HEAT.

We see also from the formula that the velocity is inversely as the square root of the density of the gas—the pressure being the same. Thus, a sound-wave travels about four times faster in hydrogen than in air.

We see also that, within the limits of approximation that we have used, the velocity does not depend on the intensity, pitch, or quality of the Sound (q.v.). The investigations which seem to lead to slight modifications of this conclusion are too recondite to be introduced here. We can only mention, also, the beautiful investigations of Stokes (q.v.) connected with the extinction of a sound-wave as it proceeds, partly by fluid friction, partly by radiation. And we may conclude by stating that the result of a completely general investigation of the velocity of a sound-wave gives, to a first approximation, the result we have deduced from the study of a simple particular case.

We come now to consider waves in water. Of these, there are several species. One, however, we may merely mention, as its theory is the same as that just now briefly discussed: this is a sound-wave, or *wave of compression*, in water. Its velocity is considerably greater than that of sound in air (see SOUND). The others, which are commonly observed on the surface of water, depend on mere changes of level, and their effects; and in studying them, we may consider water as incompressible.

The first of these is what is called a *long* or *solitary* wave. Its essential characteristic is, that its length is great compared with the depth of the liquid in which it moves. To this class belong the tide-wave (see TIDES), and the long wave which accompanies a canal-boat, and which we see slowly traversing the canal when the boat is stopped. Scott Russell has made many interesting observations on this wave, all of which accord well with the results of the mathematical theory of its propagation. The velocity of this wave depends solely on the depth, not on the density of the liquid in which it moves—and in a uniform canal the velocity is that which would be acquired by a stone falling freely through a space equal to half the depth of the water. Another characteristic of this wave is that, after it has passed, it leaves the water bodily transferred through a small space along the bed of the canal—forward or backward, according as it consists of an elevation or a depression of the water-surface. Scott Russell has shown that the most favorable rate at which a canal-boat can be drawn is when its velocity is such that it rides on the crest of the solitary wave. If drawn at any other speed, it leaves the solitary wave behind, or is left by it; and in either case, part of the horse's work is expended in producing fresh solitary waves. An excellent mode of observing these waves is to tilt slightly a rectangular box containing some water, and restore it to its original position. A long wave is thus formed, which is reflected repeatedly at the ends of the box, and whose rate of motion may be accurately observed by watching the image of a

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candle reflected at the surface of the water. If the sides of the box be made of glass, and some light particles be dispersed through the water, their motions enable us to discover all the circumstances of the propagation of this wave.

We come next to what are called *oscillatory* waves in water or other liquids. To this class belong all waves whose length from crest to crest is small compared with the depth of the liquid; from ripples on a pool to the long roll of the Atlantic. They are never observed as solitary waves, their general characteristic being their periodical recurrence. And, by watching a piece of cork floating on the surface, we see that it moves forward when at the crest of the wave, and backward through an equal amount when in the trough. Also it rises while passing from trough to crest, and sinks from crest to trough. Mathematical investigation, confirmed by experiments with floats at sea, and with short waves in the glazed box above described, shows that each particle of the water describes a *circle* about its position of rest in the vertical plane in which the wave is advancing. Particles at greater and greater depths describe smaller and smaller circles. The diameters of these circles diminish with extreme rapidity. At a depth equal to the distance from crest to crest (i.e., the length of the wave), the displacement of the water is already only $\frac{1}{338}$ of that at the surface. At the depth of two wave-lengths, it is about $\frac{1}{36000}$ of that at the surface. Thus we may see to how small a depth the ocean is agitated even by the most tremendous wind-waves; for, according to Scoresby, 43 ft. is about the utmost difference of level between crest and trough in ocean-waves. If the wave-length be 300 ft. (a large estimate), then at a depth of 300 ft. the water-particles describe circles whose radii are only the $\frac{21.5}{535}$ of a foot, or about four-tenths of an inch; and at 600 ft. this is reduced to $\frac{1}{1200}$ of an inch; while the depth of the Atlantic is in many parts more than three or four miles. In this case, the velocity of propagation of the wave has been shown to be

$$\sqrt{\frac{gl}{2\pi}},$$

where g is, as before, 32.2 ft.; l is the wave-length in ft.; and π is the ratio of the circumference of a circle to its diameter (see QUADRATURE OF THE CIRCLE). Thus the velocity of an oscillatory wave in deep water is proportional to the square root of its length. This fact has been of use as an analogy in helping us to account for the *Dispersion* (see REFRACTION) of Light, where, by experiment, we know that the waves of red light are longer than those of blue light, also that they travel faster in refracting media.

When the depth is not infinitely great compared with the length of a wave, theory and experiment agree in showing that the motion of each particle takes place in an ellipse whose major axis is horizontal. These ellipses diminish rapidly in length as we descend in the liquid, but still more rapidly in breadth; so that, as was to be ex

WAVELLITE.

pected, the particles *at* the bottom oscillate in horizontal straight lines. The expression for the velocity of propagation is now far less simple than in the previous cases, but is easily shown to include the values above given.

So far, the first approximation. A section of the surface made by a vertical plane in the direction of the wave's motion is shown to be bounded by the *Harmonic Curve*, or *Curve of Sines*, the form assumed by a vibrating string (see *SOUND*); from which it follows that the crests are similar to the troughs. The second approximation makes the troughs flatter, and the crests steeper, and also shows that the particles are, on the whole, carried *forward* by each successive wave. The amount of this progression diminishes rapidly with the depth below the surface. A third approximation shows that the velocity is, *cæteris paribus*, greater the greater is the height of the waves.

When waves advance toward the shore, their circumstances change, in general gradually, from those of oscillatory waves to those of waves of translation, as the depth of the water becomes less and less considerable in comparison with the length of the wave; and it is found by experiment that they 'break,' as it is called, when the depth of the water is about equal to the height of the crest above the undisturbed level. All the curious phenomena of breakers are thus easily explained by the results above given, when they are considered with reference to the gradual alteration of the depth of the water.

Finally, we must notice a singular phenomenon often observed—viz., that, of a series of waves breaking on the coast, every eighth, or ninth, or tenth, etc., is seen to be higher than its predecessors or successors. The explanation is simple, and points to the simultaneous existence of two or more sets of oscillatory waves of different lengths, due in general to quite distinct causes, which reach the shore together.—For further information on this subject, see papers by Stokes in the *Cambridge and Dublin Math. Journal*, IV.; the *Cambridge Phil. Trans.*, VIII.; Airy's 'Tides and Waves' in *Encyclopædia Metropolitana*.

The above might lead us to consider the very interesting case of '*Co-existence of Small Motions*' presented by the Interference (q.v.) of such waves; but sufficient examples of the great principle involved are given in various articles (see *POLARIZATION: SOUND: UNDULATORY THEORY*).

There remains the consideration of the propagation of waves in elastic solids, among which, at least so far as luminiferous vibrations are concerned, it appears that the Ether (q.v.) must be ranked. This is a subject of a higher order of difficulty than any of those above mentioned, and, in the case of light at least, has not yet been treated in a thoroughly satisfactory manner, though profound memoirs have been written on it.

WAVELLITE, n. wā'vēl-līt [after *Wavel*, Eng. physician, its discoverer]: a transparent yellowish-gray or greenish-gray mineral, consisting of hydrous phosphate of alumina, and occurring in minute acicular crystals, in various formations.

WAVER—WAWL.

WAVER, *v.* *wā'vēr* [Scot. *waif*, to move backward and forward: Icel. *vafra*, to hover about: O.Ger. *waberen*, *wabelen*, to fluctuate: Norw. *vavra*, to flap about—from **WAVE** (which see)]: to play or move to and fro; to be unsettled in opinion; to hesitate; to be undetermined; to totter; to falter under fire, said of troops. **WA'VERING**, *imp.* **WA'VERED**, *pp.* *-vèrd*. **WA'VERER**, *n.* *-ér*, one who wavers or vacillates; one unsettled in faith, doctrine, or opinion. **WA'VERINGLY**, *ad.* *-lī*. **WA'VERINGNESS**, *n.* *-nēs*, vacillation.—**SYN.** of 'waver': to fluctuate; reel; vacillate.

WAVERLEY NOVELS: a series of anonymous historical romances taking name from the first, entitled *Waverley: or 'Tis Sixty Years Since*, published 1814, July. The series closed with *Tales of My Landlord*, fourth series, 1831. The authorship of the series was acknowledged by Sir Walter Scott (q.v.) at a dinner 1827, Feb. 23.

WAVERLY, *wā'vēr-lī*: town in Tioga co., N. Y.; on the Chemung river, and on the Delaware Lackawanna and Western, the Erie, and the Lehigh Valley railroads; 18 m. e.s.e. of Elmira, 41 m. w. of Binghamton. It is in an agricultural region; is an important shipping-point for grain and butter; and contains 8 churches, union high school, several flour and planing mills, tanneries, railroad car-wheel works, foundry, cigar factories, 1 national bank (cap. \$50,000), 1 state bank (cap. \$50,000), and 1 daily newspaper. Pop. (1880) 2,767; (1900) 4,465.

WAVES, OIL ON THE: see **OIL ON THE WAVES**.

WAVRE, *vāv'r*: town in the province of S. Brabant, Belgium; 15 m. s.e. of Brussels (pop. 5,900); scene of a desperate and protracted conflict between the French and Prussians, 1815, June 18, 19. The French, under Grouchy, Gérard, and Vandamme, advanced against the Prussians at the same time that Napoleon directed the troops under his immediate orders against Wellington at Waterloo (q.v.), and, being much superior in number (32,000 to 15,200), drove the Prussians, under Thielmann, into W., where they defended themselves with desperate firmness, repulsing 13 different assaults in the course of the 18th. On the following morning, Thielmann, who had heard of the victory at Waterloo, attacked Grouchy, but was repulsed with vigor, though the urgent orders of Napoleon forced the latter to retreat to Laon, instead of following up his success.

WAVY, WAVINESS: see under **WAVE**.

WAVE, or **WAW**, *n.* *waw*: in *OE.*, a wave.

WAWL, or **WAUL**, *v.* *wawl* [*AS.* *wealwian*, to roll]: in *Scot.*, to roll the eyes; to glance at in a fierce manner; to glower.

WAX.

WAX, n. *wāks* [AS. *weax*; Icel. *vax*; Ger. *wachs*; Dan. *vox*; Dut. *was*; Russ. *voska*, wax]: properly the thick, sticky substance secreted by bees, and employed by them in the construction of their cells—also **BEES-WAX**, *bēz*-; a similar substance secreted by some insect of the Coccus family, or obtained from the leaves and fruit of certain plants (see below); any substance resembling wax; the brown substance found in the ear—usually *ear-wax*: substance used to seal letters—usually *Sealing-wax* (q.v.); resinous substance used by shoemakers—usually *shoemakers'* or *cobblers' wax*: in *slang*, a state of passionate excitement or anger, as to be in a *wax*; puddled clay used by miners for dams, or the like: V. to rub, smear, or unite with wax. **WAX'ING**, imp. rubbing thread with wax to strengthen it. **WAXED**, pp. *wākst*. **WAXEN**, a. *wāks'n*, made of wax; covered with wax; soft like wax. **WAX'Y**, a. -ī, resembling wax; adhesive; not floury, as a potato; in *slang*, angry. **WAX-CANDLE**, a candle made of wax. **WAX-CLOTH**, cloth covered with a coating of wax, and ornamented with some figured pattern, used as covers for tables, pianos, etc.; a name also applied to floor-cloth. **WAX-END**, or **WAXED END**, thread covered with shoemakers' wax, and pointed, with a bristle. **WAX-LIGHT**, a wax-taper. **WAX-MODELLING**, the art of making figures, flowers, fruit, etc., in wax. **WAX-WORK**, figures of men, animals, flowers, fruits, etc., formed in wax: anatomical preparations in wax; an exhibition of wax figures; a plant, the climbing bitter-sweet, *Celastrus scandens*. **WAX'Y INFILTRA'TION**, in *pathol.*, the infiltration of waxy matter into any organ of the body. The most highly-developed and dangerous form of it is waxy degeneration of the liver. **GRAVE-WAX**, a name for **ADIPOCERE** (q.v.).

WAX, v. *wāks* [AS. *weaxan*; Goth. *vahsjan*; Icel. *vaxa*; Dut. *wassen*; Dan. *væxe*; Sw. *våxa*; Ger. *wachsen*; Skr. *vaksh*, to grow, to increase]: to increase; to become larger; to pass from one state to another; grow; become, as to *wax* fat. **WAX'ING**, imp. **WAXED**, pp. *wākst*, also in *OE.* and *poetry*, **WAXEN**, pp. *wāks'n*, grown; increased.

WAX: a solid fatty substance derived from both the animal and the vegetable kingdoms. Matters comprised under this term are in general allied to the Fats; but they differ materially from them in chemical composition, some kinds being found to consist partly of mixtures of alcohols and compound ethers, and partly of free fatty acids. The general properties of the various substances called *wax* may be thus laid down: They are solid or semi-solid matters; are easily broken when cold, but at a moderate warmth are soft and pliable, and fuse at a temperature below 212°. They have a peculiar glistening appearance, are lighter than water, are insoluble in that fluid and in cold alcohol, but dissolve readily in ether; they are combustible and burn with an illuminating flame, are non-volatile, and when heated in a free atmosphere undergo decomposition. In this category are included Spermiaceti (q.v.), bees-wax, Chinese wax, and other less-known kinds, as palm or vegetable wax (obtained from the

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bark of *Ceroxylon andicola*, by the action of hot water and pressure), Carnahuba wax (exudation from the leaves of a Brazilian palm: see CARNAHUBA PALM), sugar-cane wax, etc.

Bees-wax is an animal secretion formed by bees from sugar, and constitutes the material of which the cells of the honeycomb are composed. It is obtained by expressing the honey and fusing the residue in boiling water. In this state it is of a yellow color (*Cera flava*). It may be bleached, so as to form white wax (*Cera alba*), by being exposed in thin slices to the action of solar light, or by the action of nitric acid. (Chlorine readily destroys the color, but renders the wax unfit for candle-making, as a portion of the hydrogen of the wax is replaced by chlorine, and the candles, when burning, evolve irritating vapors of hydrochloric acid gas.) Wax consists of three different substances, *myricin*, *cerotic acid*, and *cerolein*, which are separable from one another by means of alcohol. *Myricin*, insoluble in boiling alcohol, constitutes 20–30 per cent. of the bulk of ordinary wax. *Cerotic acid*, which dissolves in boiling alcohol, but separates on cooling, varies in quantity in different specimens. In one sample of genuine bees-wax, Brodie found that it constituted 22 per cent., and it was always present in European samples, while in Ceylon wax it was entirely lacking. This curious variation in the nature of an animal secretion, under different conditions of life, resembles the variations sometimes noticed in the acids of butter, in which the butyric and caproic acids of one season are replaced in another by vaccinic acid, differing from the former acids in the amount of oxygen alone. *Cerolein*, the substance soluble in cold alcohol, is a greasy body, constituting 4 or 5 per cent. of ordinary wax. Bees-wax yields the following derivatives: cerotic acid or cerin, $C_{27}H_{54}O_2$; ceryl alcohol or cerotin, $C_{27}H_{56}O$; myricylic or melissic alcohol, $C_{30}H_{62}O$; melissic acid, $C_{30}H_{60}O_2$; palmitic acid, $C_{16}H_{32}O_2$; myricin, $C_{16}H_{31}O_2$; and melene, $C_{30}H_{60}$.

Chinese Wax ($C_{27}H_{55}$, $C_{27}H_{53}O_2$) is the product of a species of insect of the *Coccus* family (*Coccus pela*), and consists principally of ceryl cerotate.

Both yellow and white bees-wax occurs in the *Pharmacopœia*. The characters and tests, as given in that work, are—*Of yellow wax*: ‘Firm, breaking with a granular fracture, yellow, having an agreeable honey-like odor; not unctuous to the touch, does not melt under 140° , yields nothing to cold rectified spirit, but is entirely soluble in oil of turpentine; boiling water in which it has been agitated, when cooled, is not rendered blue by iodine.’ *Of white wax*: ‘Hard, nearly white, translucent; not unctuous to the touch, does not melt under 150° .’ The iodine test is used because wax is often adulterated with starch. Wax was formerly much employed internally as an emollient medicine, in cases of suspected ulceration of the intestines. At present it is used only as an external agent, being an ingredient of many ointments and plasters.

The commercial value of bees-wax is very great; and

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if it were possible to ascertain the total of the quantity produced, it would cause surprise at the amount of valuable material derived from a source apparently so insufficient. Its chief uses are for candles, modelling, medicinal cerates or ointments; besides many minor purposes. In the ceremonies of the Greek and Roman churches, a great quantity of bees-wax is consumed in candles. Chinese W., or *pe-lu*, has been used in the manufacture of candles; but it is far too costly for general use (see WAX-INSECT). In China this wax is very highly valued, and is so costly as to be used only by the highest classes; it is white, and breaks with crystalline fracture and pearly lustre. Of Vegetable Wax, four distinct kinds are known in commerce. The first in importance is the JAPAN WAX, almost as white and compact as refined bees-wax, which it closely resembles: it is said to be obtained by boiling the seeds of a species of RHUS (*R. succedanea*). It has been used only in making candles. BRAZILIAN VEGETABLE WAX is an article of regular importation, but only in small quantities; it is obtained from the leaves of *Corypha cerifera*, the Carnahuba Palm of the Brazilians. It forms a glossy varnish-like covering; and when the leaves are gathered, and begin to shrink from withering, it cracks and peels off, and is collected and melted into masses. It is hard and brittle, and of dull yellow color. The candle-makers have used it for mixing and improving other materials. In Brazil, candles are wholly made of it, or half the quantity of stearin is added. The VEGETABLE WAX of the Andes is yielded also by a palm (see WAX-PALM): though much used in Mexico, it has not yet become of commercial importance to other countries. It is used chiefly for candles in the churches. MYRTLE WAX was in former times much used in the United States as a material for candles: it is procured by boiling the berries of *Myrica cerifera* in N. America, and probably from other species in Brazil and at the Cape of Good Hope. It resembles bees-wax very much, except that it has a greenish-yellow instead of yellow color. It is used only for candle-making: see CANDLEBERRY.

Of the manufactured compounds called wax, the following are the chief: SEALING-WAX (q.v.); MODELLERS' WAX, used by artists for modelling small works—consisting of equal parts of bees-wax, druggists' lead-plaster, olive-oil and yellow resin, and just sufficient whiting added to produce the consistency of putty; GILDERS' WAX—consisting of four parts of bees-wax, well mixed by melting with one part each of verdigris and sulphate of copper.

The bees-wax of commerce is of dirty-yellow color, and with many impurities: it has, consequently, to undergo a process of bleaching, by which it is rendered quite white and pure. The usual process is to melt the wax with boiling water, and stir them together for a short time, to separate the impurities from the wax. It is then allowed to rest for a short time, and the pure wax floats on the top; and when cold is taken off in a cake, the lower part of which is often discolored with the dirty water. This part is scraped off, and mixed with the next lot to be operated

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on. The purified portion is next remelted, and then allowed to trickle from the melting-pan on to a wooden cylinder, revolving rapidly, and partly immersed in pure cold water, in a large cistern. This throws it into the water in the form of fine thin feather-like flakes, which cool and harden instantly in the water. When all is run off, the wax is removed from the water, and laid on linen cloths, placed on tables in a field, for the air to bleach. From time to time the flakes are turned over and examined; and when the bleaching effect of the air seems to have ceased, the wax is remelted, and converted into flakes in the cistern, and replaced in the bleaching-ground until it is quite white.

WAX, MINERAL: natural product known under the name of Ozokerit. It was formerly found only in small quantities oozing from rocks of coal formation; though, near Edinburgh, candles, as curiosities, were made of it by the miners: but this hydrocarbon is now got in Wales, in Galicia and Roumania, in Utah and California, and has become an important commercial article for manufacture of candles. When found, it has a dark, rich-brown color, slightly greenish and translucent in thin films; but when refined it resembles well-bleached bees-wax. Its melting-point is about 60°.

WAXAHACHIE. *wăk-sa-hăch'ê*: county-seat of Ellis co., Texas; on the Houston and Texas Central and the Missouri Kansas and Texas railroads; 180 m. n.w. of Austin, 28 m. s.w. of Dallas. It is in a fertile agricultural region; cotton, wheat, and corn are principal products. It has 3 public schools, 7 churches, 4 banks, and several newspapers, and Marvin College (Meth.), organized 1869. Pop. (1890) 3,076; (1900) 4,786.

WAX-FLOWERS: flowers (and fruit) modelled in wax. The wax is bleached and prepared in thin sheets of various colors, which are cut out into the shapes for petals and leaves, according to the kind of flower to be imitated. They are easily made to adhere either by a slight heat or a little melted wax.

WAX-INSECT (*Coccus sinensis*: see *Cocculus*): very small white insect, native of China, of the same genus with the Cochineal and Kermes insects, and with the Scale-insects, valuable for the wax which it produces. It is found about the beginning of June on the branches of certain trees, particularly *Rhus succedaneum*, a kind of sumach, on whose juices it feeds. The wax is deposited on the branches as a coating like hoar-frost. This is scraped off toward the end of August, melted in boiling water, and strained through a cloth: see **WAX**. The Chinese W.-I. has been introduced by the French into Algeria.—The name W.-I. is applied also to several other wax-producing insects, such as the *Coccus ceriferus*, or Indian wax-scale; *C. Myricæ*, found at the Cape of Good Hope; *C. floridensis*, or wax-scale of Florida; *Cerococcus quercus*, which secretes masses of bright-yellow wax on oaks; and various insects of the family *Fulgoridæ*.

WAX-MYRTLE—WAXWING.

WAX-MYRTLE: see CANDLEBERRY.

WAX-PAINTING: same as Encaustic Painting (q.v.).

WAX-PALM (*Cerorylon andicola*): lofty palm, found in the Andes, on the e. borders of Peru, 3,000 ft. and upward above sea-level. It grows to the height of 160 ft.; and on the cicatrices of the fallen leaves is produced an abundant resinous secretion, composed of about two parts of yellow resin and one of a kind of wax, more brittle than bees-wax. This wax exudes also from the leaves, and is whitish, almost inodorous, except when heated, when it gives out a resinous odor. It is used in the country in which it is produced for making candles, but is usually mixed with wax or tallow. The usual method of obtaining the wax is by felling the tree. Each tree yields about 25 lbs. The wax is scraped off, melted, and run into calabashes. The timber of this palm is very hard and durable; the leaves are used for thatching, and the fibres for cordage. The tree is beautiful, with a stately stem, and head of large pinnate leaves.—In some n. provinces of Brazil, wax is obtained from the Carnahuba Palm (q.v.).

WAX-SCULPTURE: ancient application of wax in art. Not only have the tombs of s. Italy yielded many specimens of portraits of the deceased modelled in wax, but also many fine bronzes in antiquarian collections bear evident marks of having been modelled in wax by the process called *cire-perdue*. This consists in producing a model in wax, and then coating it with clay or other material in a soft state; this is allowed to harden; and the wax is then melted out by heat, and the molten metal poured in. A very fine cast of the wax-figure is thus obtained; but, of course, the wax-model of the artist is lost after the first copy is taken; hence such specimens are very highly prized by connoisseurs. During the 14th and 15th c., the art of modelling in wax, or ceroplastics, was much practiced, especially in Italy and in Germany, by many of the first artists, even Michael Angelo not excepted; and many of their original works in wax are still preserved. They were chiefly, however, in low relief, though very fine statuettes also were produced.

WAX-TREE: plant of the genus *Vismia*, nat. order *Hypericaceæ*, having a 5-parted calyx, and 5 petals, generally covered with soft hairs on the inside. All the species yield a yellow viscid juice when wounded, which, when dried, becomes somewhat similar to gamboge. The species are natives of tropical America. The name is also applied to *Rhus succedanea* and other trees from which wax is obtained: see WAX.

WAXWING: bird of the genus *Bombycilla*, family *Ampelidæ* or Chatterers (q.v.), having a short straight, elevated bill, with very wide gape, as in the Fly-catchers, but without bristles; both mandibles notched at the tip; wings rather long, broad, and pointed; legs short; toes long, with sharp and curved claws. The name W. is derived from a very peculiar character which the wings exhibit; some of the secondaries and tertiaries ter-

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minating in horny expansions of the shaft, resembling small pieces of red sealing-wax. The species are few, but widely diffused over the colder parts of the n. hemisphere. The only European species is the EUROPEAN W., or BOHEMIAN CHATTERER (*B. garrula*), found in summer in arctic regions of Europe, Asia, and America, migrating southward in winter, sometimes as far as the shores of the Mediterranean; most abundant in America, during winter, about the great lakes and the northern valley of the Mississippi. It is found also in Japan. It is an occasional winter visitant of Great Britain, especially in severe winters. It is gregarious in winter, and the flocks are often large. It feeds on insects and worms, seeds, berries, and other fruits. It is a handsome bird, nearly as large as the Song Thrush; reddish gray, with black patch on the throat and black band on the forehead; tail-coverts brownish orange; primaries, secondaries, and tail-feathers tipped with yellow, two white bands on the wings; lower parts silvery gray. The head is surmounted by an erectile crest of brownish-orange feathers. The song is a weak whistling, bearing a little resemblance to that of the thrush. It is easily tamed. The flesh is said to be delicate food.—The AMERICAN W., or Cedar-bird (*B. cedrorum* or *Carolinensis*), is a very similar but smaller species, found only in N. America, less migratory, and never visiting arctic regions. The general color is reddish olive, passing into purplish cinnamon in front, and into ash-color behind; chin black; no white on the wings; lower parts yellow. It is crested like the European W. Great flocks of cedar-birds collect in the end of summer. They feed on berries, particularly those of the red cedar. The cedar-bird is extremely voracious, and, when food abounds, sometimes gorges itself so much that it may be taken by the hand. It is in much esteem for the table.—Another species is found in Japan, having no waxy drops on the wings.

WAXWORK, *wäks'wèrk*: the climbing Bitter-sweet, *Celastrus scandens*, a beautiful shrub remarkable for its orange colored, berry-like pods, which open and show a scarlet, shining aril enveloping the seeds—hence the name **WAXWORK**. It is a smooth and high-climbing shrub, with alternate, ovate-oblong, pointed, finely serrate leaves. The flowers are small, greenish white, in racemes terminating the branches. It grows wild in low, moist ground from Canada to S. C. and w. of the Mississippi, and is cultivated for its showy fruit. The plant, either native or cultivated, comprises but two genera, *Celastrus* and *Euonymus*, the former having but one species, *Celastrus scandens*. The Latin name *Celastrus*, from the Greek *kelastros*, refers to the fruit remaining all winter.

WAXY DEGENERATION: morbid process in which the healthy tissue of various organs is transformed into a peculiar substance, allied in some respects to amyloid compounds, and in others to albuminous substances. Organs affected by W. D. have some resemblance in consistency and physical character to wax. They may be cut into

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portions of the most regular shape, with sharp angles and smooth surfaces; and the thinnest possible slices may be removed by a sharp knife for microscopical examination. Such organs are abnormally translucent, increased in volume, solidity, and weight. Usually the first parts affected by W. D. are the small blood-vessels, the middle or muscular coat being first changed. Subsequently the secreting cells become similarly affected. When a solution of iodine is brought in contact with such tissues, a very deep violet-red color is produced; and this deep-red color is alone a sufficiently characteristic test. Although amyloid degeneration is common to many tissues and organs, the parts most frequently affected are the spleen, liver, and kidneys. This morbid condition in one or more organs is the expression of a general pathological state, whose conditions and relations are as yet little known.

WAY, n. *wā* [Dan. *vei*; Dut. and Ger. *weg*; Goth. *vigs*; Icel. *vegr*; L. *via*; Skr. *vaha*, a way]: the road on which one travels, or by which some place may be reached; a passage; a road; a street; a route; length of space, as a long *way*; means of admittance; course; direction of motion or position; scope of action or observation; manner, custom, or means of doing or thinking; advance in life; humor; mode; method; progress; in *Scrip.*, the religion of Christians; Christianity. WAYS, n. plu. *wāz*, the timbers on which a ship is launched. WAY-BILL, a list of passengers and goods conveyed in a public conveyance. WAY-BOARDS, in *geol.* and *mining*, any thin layers or bands that separate or define the boundaries of thicker strata. WAYFARER, n. *fär-ér* [AS. *faran*, to go]: a traveller; a passenger. WAYFARING, a. passing; on a journey. WAYFARING-TREE, the mealy Guelder-rose (q. v.), or *Viburnum lantana*, ord. *Caprifoliaceæ* (see VIBURNUM); the American Wayfaring-tree is the hobble-bush. WAYLAY, v. *wā-lā'* [*way*, and *lay*]: to lie in wait for in the way; to beset in ambush. WAYLAY'ING, imp. WAYLAID', pp. *-lād'*. WAYLAY'ER, n. *-lā'ér*, one who waylays. WAYLESS, a. *-lēs*, pathless. WAYMARK, a mark or post to guide in travelling. WAY-TRAIN, a train that stops at all or most of the stations by the way; an accommodation-train. WAYWORN, a. wearied by travelling. To GIVE WAY, to yield; to fall; to break. To MAKE WAY, to give room for passing; to make vacancy; to force or cut a path through. To MAKE ONE'S WAY, to advance in life by steady effort. To GO ONE'S WAY, to depart. To COME ONE'S WAY, to come to. BY THE WAY, in passing. BY WAY OF, as for the purpose of; as being. COVERT, or COVERED WAY, in *fort.*, a space about 30 ft. wide running round the outer edge of the main ditch, which affords protected communication between any two points. FAIRWAY: see under FAIR 1. HALF-WAY, to the point so as to be half finished or half arrived at, as to meet *half-way*, that is, to compromise. IN THE FAMILY WAY, with child. IN THE WAY, so as to fall in with, obstruct, or hinder. MILKY WAY: see under MILK. OUT OF THE WAY, beyond the sphere of observation, so as not to fall in with, obstruct, or hinder: away from the usual or proper course; odd; unusual. PERMANENT WAY, the

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finished road-bed and track of a railway. **RIGHT OF WAY**, a right of passing over or through the ground of another; also exclusive right to pass along a particular way; precedence in passing. **TO BE UNDER WAY**, to be in motion, as when a ship begins to move; to be in progress. **TO HAVE HEADWAY**, motion forward, as a ship moving in its course. **STERN-WAY**: see under **STERN** 2. **LEE-WAY**: see under **LEE**. **TIDE-WAY**: see under **TIDE**. **TO GO THE WAY OF ALL THE EARTH**, to die. **WAYS AND MEANS**, methods; resources; in *parliamentary language*, means for raising money; resources for revenue. **HIGHWAY**, n. *hī'wā*, a wide road for traffic, made and maintained in good order at the public expense. *Note*.—*Way* or *ways* following *no*, forms a phrase meaning *in no manner* or *in no wise*,—as, 'he is *no ways* a match for him,' 'tis *no way* his interest.'

WAY, RIGHT OF, in Law: privilege of particular persons or the public to go to and fro through lands in private possession. The right of W. through private property may belong only to the owners or occupiers of a neighboring estate and those desiring to have access to them; or it may belong to a whole community—e.g., when the way is the way to a place of general resort, as to a well, to a cemetery, etc. The right of W. may arise through *prescription*—i.e., through immemorial use, or through use for a certain term of years, e.g., 20 years; or by *grant*, as when the owner of land expressly grants to another liberty to cross it; or through *necessity*, as where a parcel of land can be reached only through the estate of which it formerly was part; or through express *reservation* of the right when property is transferred; or through *custom*, as when boatmen on a navigable stream need to tow their boats along the banks. As right of way is acquired by prescription and uninterrupted use for a term of years, so it may lapse through non-use for 20 years; and it may be given up by agreement. A right of W. acquired by prescription for a foot-path is not right of way for a wagon-road.

WAYLAND, *wā'land*, the Smith [AS. **VELAND**; Old Norse, **VÖLUNDR**; Ger. **WIELAND**—from a root signifying art, cunning; whence Eng. *wile*, F. *guile*, AS. *velan*, to fabricate]; in old German mythology, son of the sea-giant Wate, a nephew of King Wilkinus, and of the sea-nymph Wac-hilt. His father had bound him, at first, apprentice to the celebrated smith Mimi, then took him across the sea to the most skilful dwarfs, from whom he soon learned all their science, and then far surpassed them. He afterward dwelt a long time in Ulfðaler (the Wolf's Valley, which, by comparison with other sagas, appears to correspond to the Greek Labyrinth) with his two brothers—Eigil, the best archer, to whom the oldest form of the Tell legend attaches; and Slagfide. Skilfully putting together and supplementing the various old legends, Simrock has produced the saga of W., as a whole, in his poem *Wieland der Schmied* (Bonn 1835), and in the 4th part of his *Heldenbuch* (Stuttg. 1843). The legend was a favorite one among all the Germanic nations; even old French poems and traditions tell of Gallans the

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smith. Besides the German tradition, it is found most distinctly among the Greeks, in the stories of Dædalus, Hephæstus, Erichthonius, etc. Next to Jacob Grimm's profound discussion in the *German Mythology*, Kuhn has pointed out in the best manner the signification and ramifications of the myth in his treatise, *Die Sprachvergleichung und die Urgeschichte der Germ. Völker*, in *Zeitschrift für vergleichende Sprachforschung* (IV. Berl. 1854).

WAYLAND, *wā'land*, FRANCIS, D.D., LL.D.: educator: 1796, Mar. 11—1865, Sep. 30; b. New York; son of Francis W., Bapt. minister of English birth. He graduated at Union College 1813; studied medicine 1813–16, divinity at Andover Theol. Seminary one year, and then was till 1821 tutor at Union College. He became pastor of a Bapt. chh. in Boston 1821, and quickly won distinction as a pleasing orator and a deep thinker. His discourses on the *Moral Dignity of the Missionary Enterprise*, 1823, and on the *Duties of an American Citizen*, 1825, spread his fame throughout the country. He held a professorship in Union College 1826, and the next year was chosen pres. of Brown Univ., which post he held till 1855. His influence was felt in every department of the univ., and students began to resort thither in great number. Besides holding the chief administrative office of the univ., W. was prof. of polit. economy, psychology, and ethics; and by his lectures and talks awakened in his pupils and in the whole institution a quick interest in moral and intellectual matters. His lectures were not, as till then had been the custom at Brown, mere commentary on textbooks, but the result of his own elaboration of the subject: thus his hearers were enabled to witness, and in a measure to co-operate in, the development of the master's philosophical system. Weekly he addressed the whole univ. from the pulpit, and very frequently joined the prayer-meetings and conducted Bible classes. The organization of the univ. was remodelled in accordance with W.'s advanced ideas of a modern education 1850, and a larger liberty was accorded to the students in selecting courses of study. After his retirement from the presidency of Brown 1855, he was for some time pastor of a Bapt. chh. in Providence. the remainder of his life was given to works of benevolence to the unfortunates in prisons and reformatories.—His published works are very numerous, treating of *Moral Science* (1835); *Political Economy* (1840); *Intellectual Philosophy* (1854); etc.—His son FRANCIS W. LL.D. (b. Boston, 1826, Aug. 23), graduated at Brown; began the practice of law 1850; was judge of a Conn. court 1864, and lieut. gov. of Conn. 1869; became 1872 prof. in the Yale Law School, and 1873 dean of the school.

WAYMENT, v. *wā-mēnt'* [a modification of *lament*: the first part of the word is due to int. *wo* or *woe*]: in *OE.*, to lament: N. in *OE.*, wailing; lamentation.

WAYNE.

WAYNE, *wān*, ANTHONY: soldier: 1745, Jan. 1—1796, Dec. 15; b. Easttown, Penn.; descendant of an English farmer who settled first in Ireland and later in Chester co., Penn. W. was educated in an acad. in Philadelphia, and became land-surveyor. He was one of the Penn. delegates to a convention of representatives of the colonies to deliberate on their relations with England 1774, and to a similar convention 1775; during the same years he was member of the Penn. colonial legislature and of its committee of safety. He was commissioned col. of a Penn. regt. 1776, Jan. 3, and was attached to the n. army under Gen. John Thomas. At Three Rivers, W., though wounded and defeated, saved his command, and at Ticonderoga with his troops led the charge. As brig.gen. he joined Washington's army in N. J. 1777, Feb.; and by his energy and address won from Washington the praise of 'bravery and good conduct.' At the battle of Brandywine W. defended Chadd's Ford through the day, preventing the passage of the river by the Hessian troops; then he retreated in good order. While with a flying detachment W. harassed the British rear, he was attacked by a superior force; but bore the brunt of the British onset with his right wing, while he ordered the left to lead the retreat: the command was again in order of battle that night at no great distance from the scene of the attack. He was court-martialled for his conduct of this affair, and was acquitted 'with the highest honor.' At Germantown, W., commanding the right wing of the army, occupied by a charge the position assigned him, then drove the enemy two miles, when the order was given to fall back. He directed with efficiency the foraging for the army at Valley Forge in the winter 1777-8, and brought in great spoil of horses, cattle, and miscellaneous supplies from within the enemy's lines. He hung on the rear of the royal commander Gen. Clinton, as he retired from Philadelphia. W.'s command made the first attack at Monmouth, but was recalled by Gen. Charles Lee. When Washington took the chief command, W. achieved victory for the American arms. To W. was assigned by Washington the command of a light-infantry corps in the summer of 1779: among the brilliant achievements of W.'s light infantry was the capture of Stony Point (q.v.), a memorable military *coup*. In recognition of his valor and generalship in this action, congress voted a gold medal to W. He was sent the next year to capture Fort Lee, but, finding the place too strongly fortified, he ravaged the surrounding country and carried off cattle, horses, etc. A very serious mutiny among the troops of the Penn. line was stilled by W., who appeased the discontent of the soldiers. While under orders to join Lafayette in Va., W. attacked at Jamestown Ford a British force which seemed to be falling back to avoid conflict with Lafayette. The attack was made according to orders received from Lafayette, but W. found himself face to face with the entire British force. Retreat was impossible; so he made a charge on the enemy and then retired, having foiled a projected maneu-

WAYS AND MEANS.

ver of the enemy against Lafayette. He had a prominent part in the investment and capture of Yorktown. He received the brevet rank of maj.gen. 1783, Oct. 10. W. represented Chester co. in the Penn. legislature 1784; was member of the Penn. convention that ratified the U. S. constitution; settled on a grant of land in Ga.; was representative in congress from Ga. 1791-2; was appointed gen.-in-chief of the U. S. army 1792, Apr. 3. He commanded a force in the 'northwestern territories' 1793; and in two vigorous campaigns broke the power of the Indian tribes, and so gave peace to the frontier settlements. He was then appointed sole commissioner to treat with all the Indians of the northwest; while engaged in the duties of this post, he died of gout. His impetuosity in battle won for him the sobriquet 'Mad Anthony W.' The aborigines named him 'Black Snake,' a creature bold in attack, and seldom worsted.

WAYS AND MEANS, COMMITTEE OF: in legislative assemblies, a number of members whose duty is to devise measures for raising the revenue needed for conducting the govt.: in the Brit. house of commons the committee of W. and M. is a committee of the whole house. In the U. S. house of representatives it is one of the standing committees, and consists of a number of members determined by the rules of the house (13), and chosen by the speaker of the house, who also names the committee's chairman. It is the most important of the house committees, except when circumstances temporarily elevate to first importance some other committee--e.g., the committee on banking and currency, in a time of financial crisis; or that of foreign affairs; or of military affairs, etc. Places on the committee of W. and M. are given to leaders of the parties represented in the house; the chairmanship, being the most influential post in the house after the speakership, is always given to a foremost party leader, and commonly to some leader defeated in the canvass for the speakership. This committee is not only the foremost of the house committees—it is distinctive of the house of representatives; for the senate, not being charged with the duty of raising the money needed by the govt., has no committee of W. and M. Projects of taxation, direct or indirect, whether of domestic products or of importations, are considered and formulated by the committee of W. and M.; around its deliberations are centred all the public and private interests concerned in questions of free-trade or protection, etc. In the house which passed the memorable act of 1891 for the protection of American industries, this committee was composed of William McKinley of O., commonly regarded as the author of the bill (chairman), Julius C. Burrows of Mich., Nelson Dingley, Jr., of Me., and 5 other prominent republicans; with (on the democratic side) John G. Carlisle of Ky., Roger Q. Mills of Tex., Clifton R. Breckinridge of Ark., and two other democratic leaders.

WAYWARD—WEAL.

WAYWARD, a. *wā'wērd* [Eng. *way*, and AS. *weard*, in the direction, toward]: bent on one's own way; wickedly froward; perverse; wilful. **WAY'WARDLY**, ad. *-lī*. **WAY'WARDNESS**, n. *-nēs*, frowardness; perverseness.

WAYWODE, or **WAIWODE**: see **VAIVODE**.

WE, pron. *wē* [AS. *we*; Dan. and Sw. *vi*; Dut. *wij*; Ger. *wir*; Icel. *vér*]: plu. of the personal pronoun I, equal to 'I and another or others; 'he (or she, or they) and I.' *Note*.—*We* is used by sovereigns in addressing their subjects instead of the more familiar I; also by authors, editors, and the like, with the view of avoiding the appearance of egotism.

WEAK, a. *wēk* [AS. *wác*, pliant; Icel. *veykr*, weak; Dan. *veg*; Sw. *vek*, pliant; Ger. *weich*; Dut. *week*, soft, yielding to the touch]: yielding to or giving way under pressure; having little physical strength; feeble; infirm; easily broken; yielding; not strong; faint or low, as sound; not furnished with sufficient ingredients, as *weak* tea; thin; diluted; unfortified; not well supported by reason or argument; not having moral force; not strong in character. **WEAK'LY**, a. *-lī*, not strong; not healthy; AD. feebly; faintly; injudiciously; indiscreetly. **WEAK'NESS**, n. *-nēs*, want of physical strength; want of force or vigor; want of moral force; feebleness of mind; want of judgment; failing; fault; defect. **WEAK-HEARTED**, **WEAK-SPIRITED**, a. timorous; cowardly. **WEAK SIDE OR POINT**, that part of a person's natural disposition by which he is most easily biassed or won; a foible. **WEAKEN**, v. *wēk'n*, to impair the strength of; to enfeeble; to enervate; to debilitate; to grow weak. **WEAKENING**, imp. *wēk'nīng*. **WEAKENED**, pp. *wēk'nd*. **WEAK'ENER**, n. *-nēr*, one who or that which weakens. **WEAK'LING**, n. a feeble creature.—**SYN.** of 'weakness': failure; imperfection; foible; frailty; infirmity; feebleness; debility; languor; imbecility; decrepitude; faintness.

WEAK-FISH: fish of the family *Sciænidæ*, and genus *Otolithus* (*Cynoscion*), inhabiting the Atlantic coasts of the United States. *Otolithus* (*Cynoscion*) *regalis* is the common W.-F., or Squeteague (q.v.). Other species are *C. nothus* or White Weak-fish, and *C. nebulosus* or Spotted Weak-fish. The W.-F. is so called from its tender mouth.

WEAL, n. *wēl* [AS. *wel*, well; *wela*, abundance; OHG. *wela*, wealth; Dan. *vel*; Sw. *väl*; Ger. *wohl*, welfare]: a sound or prosperous state; happiness; prosperity; welfare; in *OE.*, state; public interest. **WEAL OR WOE**, prosperity or adversity. **WEALTH**, n. *wēlth*, riches; large possessions; an extraordinary abundance of this world's goods (see **CAPITAL**: also **POLITICAL ECONOMY**, with its references so far as relevant): affluence; in *OE.*, prosperity; external happiness. **WEALTH'Y**, a. *-ī*, rich; having possessions greater than the generality of men; opulent. **WEALTH'ILY**, ad. *-lī*, in a wealthy manner; with wealth; richly. **WEALTH'INESS**, n. *-nēs*, state of being wealthy. **THE WEALTHY**, persons in opulent circumstances. **WEALSMAN**, n. *wēlz'mān*, in *OE.*, a statesman; a politician. **COMMON OR PUBLIC WEAL**, the welfare of the state.

WEAL, n. *wēl*: a spelling of **WALE** and **WHEAL** 1 (q.v.).

WEALD—WEALTH.

WEALD, n. *wēld*, or **WOLD**, n. *wōld* [AS. *weald*; Ger. *wald*, wood, forest]: a wood or forest; the low country lying between the North and South Downs of Kent and Sussex in England. **WEALDEN**, a. *wēld'n*, pertaining to the weald of Sussex and Kent. **WEALDEN GROUP** or **STRATA**, in *geol.*, that series of freshwater strata which occur between the uppermost beds of the oölite and the lower ones of the chalk formation—so called from the *weald* of Kent and Sussex, being the chief area in Great Britain of the strata of that formation (see **WEALDEN FORMATION**).

WEALDEN FORMATION, in Geology: series of freshwater strata belonging to the lower Cretaceous epoch. Having been studied originally in England, in the parts of Kent, Surrey, and Sussex called the Weald, this local name was given to the formation. It has been divided into two series, which do not differ materially from each other—Weald Clay, 550 ft.; Hastings Sand, 740: total 1,300. The Weald Clay consists of blue and brown clay and shale, with thin beds of sandstone and shelly limestone. These strata were probably lake or estuary deposits, and contain remains of the land flora and fauna, often in great abundance. The beds of limestone, called Sussex Marble, are almost entirely composed of a species of *Paludina*, not very different from the common *P. vivipara* of English rivers. The clays are often laminated by thin layers, consisting of immense numbers of the shells of minute *Cyprides*. But the most remarkable animal remains are those of the huge reptiles, such as the *Iguanodon* (q.v.), *Hylæosaurus* (q.v.), *Pterodactyl* (q.v.), and the numerous species of turtles. The vegetable fossils belong chiefly to ferns, and to the gymnospermatus orders of Conifers and Cycads; the fruits of several species of both orders have been found; and in some places the rolled trunks of *Endogenites* and *Clathraria*, belonging to Cycads, and of different species of coniferous wood, occur in enormous quantities, as at Brook Point, in the Isle of Wight, where the shore at low water is strewn with them.

The Hastings beds contain more sandstone and less clay than those of the upper Weald Clays. The remains of the huge Wealden reptiles abound in the sandstones of this division. The Tilgate forest-beds, where the *Iguanodon* was first found, and the rocks in the neighborhood of Hastings, are the best-known repositories of those fossils.

The deposition of the Wealden beds was followed by a gradual depression of the land, when these fresh-water deposits were covered by the estuary beds of the newer *Greensand*. The depression continued until the fresh-water and estuary strata formed the bottom of a deep sea, on which were deposited the immense beds of chalk and allied strata which form the bulk of the Cretaceous series. In the process of elevation, these beds have suffered denudation, so that districts which were covered with Cretaceous beds have been cleared of them, and immense valleys have been furrowed through the Chalk, Greensand, and Wealden.

WEALTH, WEALTHY: see under **WEAL**.

WEAN.

WEAN, *v.* *wēn* [Dan. *vænne*; OHG. *wennan*; Ger. *gewöhnen*; Icel. *venja*; Sw. *vänja*; Dut. *wennen*, to accustom]: to accustom to do without, as a child the breast; to alienate, detach, or withdraw, as the affections from some object of desire; to reconcile to the lack or loss of, as to *wean* one's self from the world: *N.* in *prov. Eng. and Scot.*, a child; an infant. **WEAN'ING**, *imp.*: *N.* the act of accustoming a child to do without its mother's milk. **WEANED**, *pp.* *wēnd*. **WEAN'LING**, *n.* *-ling*, a child or animal newly weaned: **ADJ.** newly weaned.—*Weaning, and Feeding in Infancy*, are subjects for medical consideration and advice. The propriety of mothers nursing their own children is now so generally acknowledged that it is the duty of the physician less frequently to urge maternal nursing than to indicate those cases in which it is necessary to substitute another mode of rearing the infant. Any mortal or weakening disease—e.g., phthisis, hemorrhages, epilepsy—obviously disqualifies from the office of nurse. Some mothers in other respects healthy have breasts incapable of secreting a sufficient supply of milk: in other instances, the breast may perform its functions well, but the nipple may be naturally so small, or so completely obliterated by pressure of tight stays, as not to admit of its being laid hold of by the child. These are actual physical hindrances to nursing. Again, women may frequently possess such sensitive and excitable temperaments as will render it imprudent for them to suckle their own children. Frightened and excited by every accidental change in the infant's countenance, and inordinately moved by the common agitations of life, such persons are kept in a continual fever, which materially interferes with the formation of milk both as to quantity and quality. Women, also, who become mothers for the first time at a late period of life have seldom the flexibility of disposition, or the physical aptitude for the secretion of milk, required to constitute a good nurse. In ordinary cases, the child should be put to the breast as soon as the breast begins to contain anything; and when the secretion of milk has fairly commenced the child will require no other food until the seventh or eighth month, provided the mother be a good nurse. During the first five or six months, the infant should be put to the breast at regular intervals of about four hours; afterward, when the teeth are beginning to appear, the child need not suck more than four times in the 24 hours, some artificial food being given to it twice during the same period. This at first may consist of soft bread steeped in hot water, with addition of sugar and cow's milk; and subsequently a little broth, free from salt and vegetables, may be given once a day. The spoon is now the best medium of feeding, as the food should be more solid than could be drawn through the sucking-bottle. The time of weaning should be that indicated by nature, when the child, being provided with teeth, has the means of obtaining its nourishment from more solid substances. If the infant has been gradually accustomed to less of maternal and more of artificial food, weaning

WEAN.

will be comparatively easy. Suddenness in the change will usually occasion suffering both to parent and to child. The ordinary period of weaning varies from the 7th to the 12th month; sometimes the child is kept at the breast for a much longer period, from the popular idea that lactation prevents pregnancy; but such unnaturally prolonged lactation is usually injurious to both mother and child.

In those cases in which it is inexpedient or impossible for a mother to suckle her own child, the choice of a wet-nurse becomes important. The following gives the substance of practical rules from high authority.—The first thing to be looked to is to ascertain that both the woman and her child are in good health. Of this, judgment must be made by the following signs: The woman's general appearance and form ought to be such as betoken a sound constitution. Her skin should be free from eruptions; her tongue clean, and indicating a healthy digestion; her gums and teeth sound and perfect; the breasts should be firm and well formed—not too large or flabby—and with perfect, well-developed nipples. The milk should flow freely, on slight pressure: a little of it should be allowed to remain in a glass, that its quality may be examined. It should be thin and of bluish-white color; sweet to the taste; and, when allowed to stand, should throw up considerable cream. A nurse should not be old, but it is better that she should have had one or two children before; as she will then be likely to have more milk, and may be supposed to have acquired experience in management of infants. Examination should be had likewise of the nurse's child, which should be well nourished, clean, and free from eruptions, especially on the head and buttocks: its mouth should be entirely free from sores or aphthæ. If both woman and child bear such an examination, the woman will be likely to prove a good nurse.—On the question as to how recent should have been the nurse's own confinement, there is some difference among authorities: the best view probably is that it is a general physiological law that the age of the milk should correspond to the age of the infant—i.e., that an infant taken at any given age from its mother, before the normal period of weaning, should be provided with a nurse who was confined about the same time as its own mother.

A wet-nurse is very much preferable to any kind of *artificial feeding*; but peculiar cases may occur in which it is impossible to procure a nurse; or an infant whose mother is incapable of nourishing it may be the subject of a disease that may be transmitted through the infant to the nurse. In these cases, a food must be provided as nearly as possible resembling the natural food; and this is naturally sought among the food of animals. The milk of the cow is most commonly used, being most easily obtained; but ass's milk more nearly resembles human milk, as is shown from the following comparative analyses by Prof. Playfair:

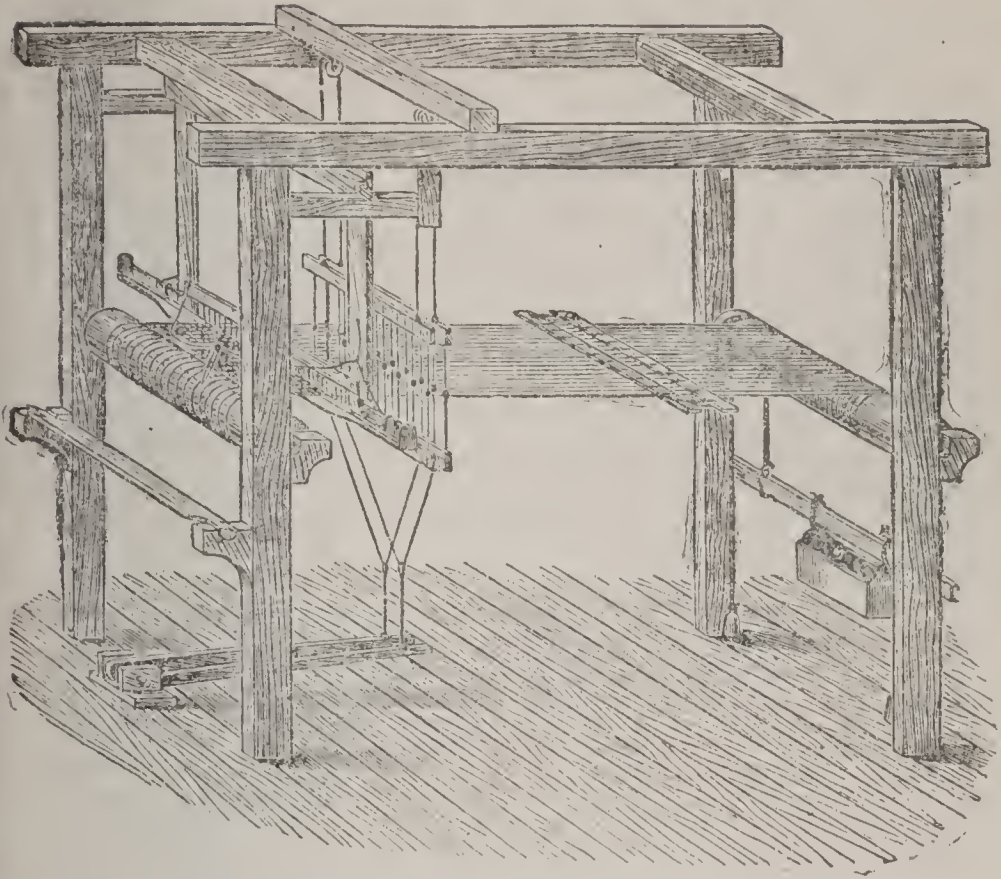
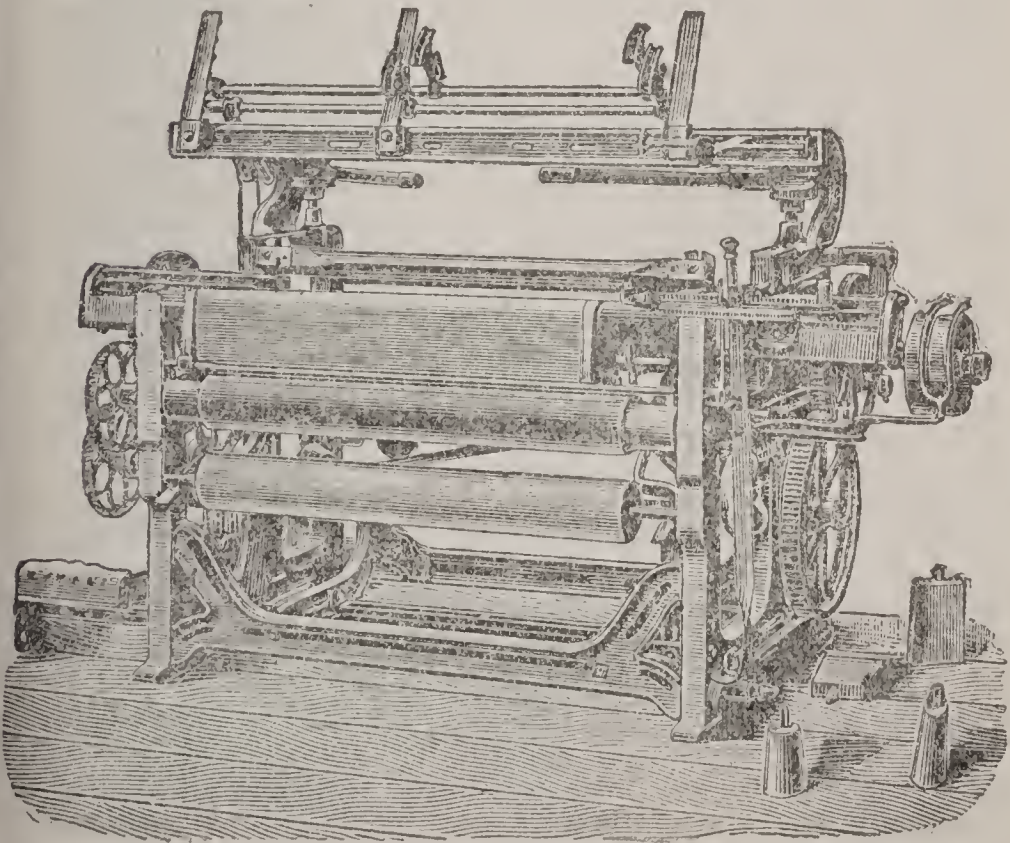


Diagram of a Hand Loom.



Power Loom.

WEAN.

	Woman.	Cow.	Ass.
Casein	1.5	4.0	1.9
Butter.....	4.4	4.6	1.3
Sugar	5.7	3.8	6.3
Ashes	0.5	0.6	...
Water.....	88.0	89.0	90.5

The most important difference between cow's milk and woman's milk is the great excess of casein in the former. The former fluid may, however, be made to resemble the latter in composition in either of the following ways: (1) On gently heating cow's milk, a membrane of casein forms on the surface; by removing two or three of these membranes as they form, we can reduce the quantity of casein to the desired extent; or (2) cow's milk may be diluted with twice its bulk of pure water, and a little sugar added. This food should be administered at a natural temperature (of about 98°) through a sucking-bottle; and as the child grows older, it will soon be able to take natural cow's milk without inconvenience.

The rules regarding the times, etc., of feeding after weaning are similar to those laid down for suckling. For some months after weaning, the food should consist principally of semi-fluid substances, such as milk thickened with baked flour, or pap, to which a little sugar should be added. Light broths also may be administered, especially in the occasional cases in which milk seems to disagree; and bread and butter may be tried in small quantity. Young mothers may take note of the following dietary for a weaned infant.—A healthy child, of two or three years old, commonly awakes hungry and thirsty at 5 or 6 A.M., sometimes earlier. Immediately after awaking, a little bread and sweet milk should be given to it, or (if the child is too young to eat bread) a little bread-pap. The latter should be warm; but in the former case the bread may be eaten from the hand, and the milk allowed to be drunk cold, as it is well at this meal to furnish no inducement for eating beyond that of hunger. After eating, the child will generally sleep again for an hour or two; and about 9 A.M. it should get its second meal, of bread softened in hot water, which latter is to be drained off, and fresh milk and a little sugar added to the bread. Between 1 and 2 P.M. the child may have dinner, consisting, at the younger ages, of beef, mutton, or chicken broth (deprived of all fat), and bread. When a sufficient number of teeth are developed to admit of chewing, a little animal food, as chicken, roast, or boiled mutton, or beef, not too much dressed, should be allowed, with a potato or bread, and some fresh, well-dressed vegetable. After dinner some drink will be requisite; and a healthy child requires, and indeed wishes for, no drink but water. Between 6 and 7 P.M. the child may have its last meal, of bread steeped in water, etc. (as at 9 A.M.). A healthy child which has been in the open air during the greater part of the day will be ready for bed shortly after this last supply, and will require nothing more till next morning. Similar regimen and hours may be adopted throughout the whole period of childhood; only, as the fourth or fifth year approaches,

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giving, for breakfast and supper, bread and milk without water, and either warm or cold, according to the weather or the child's inclination. The supply of food on first awaking in the morning may be gradually discontinued, and breakfast be given somewhat earlier.

WEAPON, n. *wēp'n* [Sw. *vapen*; Dan. *vaaben*; Ger. *waffe*; Icel. *vápn*; AS. *wæpen*, a weapon: Dut. *wapen*, arms, tools: Goth. *vepna*, arms]: an instr. of offense or defense; an instr. of war; PLU. arms; thorns, stings, etc. **WEAPONED**, a. furnished with weapons or arms. **WEAPONLESS**, a. *-lēś*, unarmed; having no weapons. **WEAPONRY**, n. *-n-rī*, a supply of weapons or instr. of war.

WEAR, v. *wār* [Ger. *währen*; Icel. *vera*; Sw. *wara*, to last, to wear: OHG. *weren*, to remain, to endure]: to last, endure, or hold out during a longer or shorter period; to waste or diminish by use or time; to be wasted or impaired, as by use; to pass or be consumed by slow degrees: N. injury or decay by use; the act of lasting long. **WEARING**, imp. **WORE**, pt. *wōr*. **WORN**, pp. *wōrn*. **TO WEAR AWAY**, to consume; to impair or diminish by gradual decay. **TO WEAR OUT**, to use till decayed or done; to exhaust; to come or bring to an end; to harass. **TO WEAR OFF**, to rub off by use; to pass away by degrees; to go off gradually. **WEAR AND TEAR**, loss or waste by use.

WEAR, v. *wār* [Icel. *verja*; AS. *werjan*, to defend, to cover: OHG. *werjan*, to defend, to clothe]: to carry or bear upon the person, as an article of clothing, arms, or any ornament; to have or exhibit an appearance of; to bear; in OE., to protect; to guard; watch: N. in OE., manner of dressing; hence, fashion; mode; things to be worn, as *underwear*. **WORE**, pt. *wōr*. **WORN**, pp. *wōrn*. **WEARABLE**, a. *wār'ā-bl*, that can be worn. **WEAR'ER**, n. *-ēr*, one who or that which wears. **WEARING APPAREL**, garments for the person; articles of dress. **TO WEAR THE BREECHES**, in *familiar language*, said of a wife who assumes the authority of her husband, or domineers over him. **WEARING**, n. in OE., clothing.

WEAR, v. *wār* [a corruption of *veer*]: used in the phrase, 'to wear a ship'—that is, to turn the ship on a different tack by bringing her stern (and not her bow) into the wind. **WEARING**, imp. **WEARED**, pp. *wārd*.

WEAR, or **WEIR**, n. *wēr* [Ger. *wehren*, to ward off, to prevent; *wehr*, a dam, a dike: AS. *wer*, a dam for fish]: a dam across a river to raise the water in order to conduct it to a water-wheel, or to irrigate land, etc.; a fence in a stream for catching and keeping fish.

WEARE, *wār*, **MESHECH**: jurist: 1713, June 16—1786, Jan. 15; b. Hampton, N. H. He graduated at Harvard 1735, studied law, and was admitted to the bar; was a member of the legislature and speaker of the house; commissioner to the colonial congress at Albany 1754; subsequently a judge of the supreme court, and 1777 chief-justice. He was elected pres. of the state 1776, and re-elected each year till the close of the war. During the revolution he was active in raising and equipping the

WEARY—WEASEL

troops sent under Stark to the n. frontier to oppose the progress of Burgoyne. He died at Hampton Falls.

WEARY, a. *wēr'ī* [AS. *werig*, weary; Ger. *währen*; Dan. *vare*, to endure: from **WEAR** 1, which see]: having the strength exhausted by toil or long-continued exertion; exhausted by mental efforts; impatient of the continuance of something irksome or disagreeable or which one desires to discontinue or abandon; causing weariness; irksome: **V.** to reduce or exhaust by physical or mental exertion; to fatigue; to harass; to render impatient of continuance. **WEAR'YING**, imp. **WEAR'IED**, pp. *-īd*. **WEAR'IALE**, a. *-ī-ā-bl*, that can be wearied. **WEAR'ILY**, ad. *-ī-lī*, in a weary or tiresome manner. **WEAR'INESS**, n. *-nēs*, exhaustion by labor too protracted; lassitude. **WEAR ISOME**, a. *-sūm*, tedious; fatiguing. **WEAR'ISOMELY**, ad. *-lī*. **WEAR-ISOMENESS**, n. *-nēs*, the quality or state of being exhausted by exertion. To **WEARY OUT**, to subdue by fatigue.—**SYN.** of 'wearisome': irksome; tiresome; annoying; vexatious; troublesome;—of 'weary, a.': jaded; tired; tiresome; fatigued; fagged; spiritless.

WEASAND, n. *wē'zānd* [AS. *wasend*; OHG. *weisunt*; Fris. *wasende*, the windpipe: Icel. *hvæsa*, to make a sound in breathing (and see **WHEEZE**): the windpipe; throat; also spelled **WESAND**.

WEASEL, n. *wē'zəl* [Ger. *wiesel*; Dan. *væsel*; Sw. *vessla*; Dut. *wezel*, a weasel]: a small carnivorous animal having short legs and a long slender body; a stoat. **WEASEL-FACED**, a. thin and sharp in the face like a weasel.—The *Weasel* belongs to the genus *Putorius* (formerly *Mustela*, which is now confined to the martens and sable), family *Mustelidæ* (q.v.); and has a very elongated body; short feet, with toes quite separate, and sharp claws; premolars 3 on each side, above and below (one less, above and below, than *Mustela*), making in all 18 premolars and molars. The **COMMON W.** (*M. vulgaris*) is a native of almost all temperate and cold parts of the n. hemisphere, except the most arctic regions. Its range does not extend quite so far n. as that of the ermine. The length of head and body varies from 6 to 8 in., and the tail vertebræ from 2 in. to less than one. The tail is pointed, with no dusky or black tip except in some Pacific-coast specimens. Unlike the ermine, the under parts are rarely if ever tinged with sulphur-color. The feet may be white like the belly, or mahogany-brown like the back. The species turns white in its northern range, as far s. as northern New England, where it is less common than the ermine. The female is smaller than the male. The W. is nimble and active, bold yet wary; it is a most persevering hunter, with scent as keen as its sight, quarters the ground like a dog, and wearies out animals larger and apparently much stronger than itself. It preys on mice, rats, voles, small birds, and other small animals, sometimes even on hares and rabbits, robs birds' nests, devouring the young birds or sucking the eggs, and is occasionally troublesome in poultry-yards, killing young chickens. It climbs walls and

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trees with great agility, and does not hesitate to plunge into water in pursuit of the water-rat. It sometimes begins by abstracting the blood of the animal which it has killed, and generally devours the brain; but when food is abundant, it carries the body to its retreat, where a considerable quantity of prey is often found, the W. preferring to eat it in a half-putrefied state. The W. generally sleeps during the day, and is most active at night. It has a disagreeable smell, strongest in hot weather, or when it has been pursued or irritated. It is capable of being tamed when taken young, and becomes docile and gentle. The female W. makes a nest of straw-leaves and moss for her young—which are produced in spring, four or five in a litter—often in a crevice of a bank, or in a hollow tree. The fur of the W. is an article of commerce in some northern countries, and W.-skins are exported in considerable quantity from Siberia to China. In the old world, it is said, the W. rarely becomes white in winter.—The Ermine (q.v.), or Stoat, is another species of weasel, varying from 8 to 11 in., exclusive of the tail, which is 2 to 5 in., brushy and black-tipped.—*P. pusilla* of De Kay (*pusillus* of Aud. and Bach.) is discarded as a small *P. vulgaris*.—The Long-tailed W. (*P. longicauda*), from Minn. w. and s.w., size of the ermine, has the brown of the back with olivaceous tinge, and the tawny or buffy under parts and feet with salmon tinge.—The Bridled W. (*P. frenatus*), Tex. and Or. to Guatemala, has the top of the head darker and blotched with white; a variety *brasiliensis* is found in Brazil.

WEATHER, n. *wæth'ēr* [Dut. *weder*; Ger. *wetter*; Icel. *vedr*, weather, wind: Pol. *wiatr*, wind: Ger. *wehen*, to blow]: the state of the atmosphere at any given time, with respect to heat, cold, wetness, dryness, etc. (see METEOROLOGY: ETC.); in *OE.*, a storm of wind and rain: V. among *seamen*, to get to the windward of; to sail against the wind past something, as a ship doubling a cape or promontory; to bear up against; to endure and resist; to gain against opposition; to waste by attrition, as rocks; in *OE.*, to expose to the air. WEATH'ERING, imp. passing with difficulty: N. the action of the atmosphere on rocks, etc., that lie exposed; a slight inclination given to the top of cornice or molding to prevent water from lodging on it. WEATH'ERED, pp. a. *-ērd*, passed with difficulty; in *geol.*, wasted, worn away, discolored, or covered with lichens by exposure to the influences of the atmosphere, as rock-surfaces. WEATHER is used as the first part of many compounds in the language of seamen, signifying 'toward the wind,' as in WEATHER-BOW, WEATHER-QUARTER, WEATHER-SIDE, etc. WEATH'ERLY, a. *-lī*, working well to the windward. WEATH'ERMOST, a. *-mōst*, furthest to windward. WEATHER-BEATEN, a. seasoned by exposure to every kind of weather; showing the results of exposure or the effects of bad weather. WEATHER-BOARD, the side of a ship which is toward the wind; a thin, feather-edged board in general wider than a clapboard but like it used overlappingly as an outside covering for the walls of a frame building: V. to nail

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boards on so as to overlap one another in order to exclude rain, snow, etc. **WEATHER-BOARDING**, the act of nailing up boards which overlap one another; the boards so nailed. **WEATHER-BOUND**, a. delayed by bad weather. **WEATHER-COCK**, a figure on the top of a spire which turns by the wind and shows its direction—so called because often made in the form of a cock; a vane; anything fickle or changeable. **TO HAVE OR KEEP ONE'S WEATHER-EYE OPEN**, to be wide awake; to be on the alert and have one's wits about one. **WEATHER-GAGE**, the position of a ship to the windward of another; a position of advantage or superiority. **WEATHER-GLASS**, an instr. which indicates the state of the atmosphere or changes of weather; a name popularly applied to the barometer. **WEATHER-MOLD OR MOLDING**, a cornice over a door or window to throw off the rain. **WEATHER-PROOF**, that protects against rough weather. **WEATHER-TIDE**, the tide which sets against the lee side of a ship, driving her to the windward. **WEATHER-WISE**, skilful in foreseeing the changes of the weather. **WEATHER-WORN**, in *geol.*, wasted or worn away by the action of the weather. **STRESS OF WEATHER**, violent and unfavorable winds. **TO WEATHER A POINT**, to gain a point against the wind; to accomplish against opposition. **TO WEATHER OR WEATHER OUT**, to pass through unscathed or without serious damage, as a ship through a storm; to encounter and pass through successfully though not without difficulty. **WEATH'ERFEND**, v. *-ér-fënd* [see **FEND**]: in *OE.*, to ward off or defend from the weather; to shelter.

WEATH'ER: condition of the atmosphere at any time in respect of heat, moisture, wind, rain, cloud, and electricity: a change of weather implies a change in one or more of these elements. The weather prognostics of every language embrace much that is shrewd and of considerable value, but more that is vague and absurd.

The changes of the moon long were, and in many minds still are, regarded as supplying the elements of prediction; but when brought to the test of accurate examination and figures, the theory of the moon's changes on the coming weather is found a delusion. This was shown especially by an examination of 50 years' observations at Greenwich, and similar old records of the weather. For some years Thomas du Boulay predicted the general character of the weather of each summer from the weather-conditions which prevailed during the week of the spring equinox preceding, supposing that the general character of the weather of the next six months is then settled, requiring only skilful reading. For a few years he speculated in grain on the faith of these predictions, which turned out correct on the whole; but later his predictions did not come true.

The truth is, that no prediction of the weather can be made for more than about two days beforehand: any attempt at a longer prediction is illusory. For the possibility and mode of making real predictions of the weather, see **STORMS**: for the system of weather forecast, see **METEOROLOGY**.

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The proximity of w. Europe to the Atlantic makes it impossible in that region to predict the weather beyond a day or two at the utmost, except in the case of considerable storms leaving the American coast and likely, if not certain, to strike widely on the coast of Europe. In Norway and the Baltic, and places toward e. Europe, the weather may be predicted for a longer time, owing to the more easterly situation. In America also, where storms advance chiefly from w. to e., gales and unsettled weather are predicted for places on the seaboard in the e. some days before; though the course that a storm may take, whether more to the n. or to the s., cannot be certainly foretold.

A forecast, conjectural indeed, yet often useful, may be made by observing the barometer, the winds, and the face of the sky—especially the cirrus cloud, most elevated and delicate of the clouds; but some previous knowledge of the general features of Storms (q.v.) is indispensable: these specially—(1) Storms have a circular area, and (2) advance in an easterly direction, bearing a low barometric pressure with them. (3) Winds blow from a high to a low barometer—the observer, standing with his back to the wind, having always the low barometer to his left in the n. hemisphere—and (4) with a force proportioned to the difference of the pressure, or to the steepness of the barometric gradient. (5) Storms are noticed first in the upper regions of the atmosphere, or in the region of the cirrus cloud. (6) In front of the storm the air is warm and humid; in the rear of it, cold, or cool and dry. With such observations, requiring only a barometer intelligently interpreted, particularly if hills form part of the landscape, the character of the weather may be foreseen for one day, or even on occasions longer. In general a falling barometer is not followed certainly by storm; but a rising barometer in bad weather indicates the passing away of the storm, though, in the colder season, possibly not without a change to higher winds and snow.

To the agriculturist and horticulturist, not high winds but hails, heavy rains, frosts, and fine weather are what are required to be known. Such forecasts were begun in the United States by Gen. Albert J. Myer; also in France by Leverrier shortly before his death; and they are gradually being introduced over the continent of Europe. But though no prediction of the weather for weeks or months beforehand can be made with any pretensions to trustworthiness, yet guesses or surmises may be formed not without some value. All observation goes to prove that predictions based on solar or other astronomical causes are without foundation, and that averages based on terrestrial observations are the only guides in the matter. Of this class are the interruptions which occur in the regular march of temperature in the course of the year. Thus, in Great Britain, cold weather generally prevails Apr. 11–14, i.e., the period of the 'borrowing days' (o.s.), and in the second week of May; and these, with some other cold and warm periods, are almost co-extensive with the n. hemisphere. Hence, then, at these times, when the weather

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becomes cold or warm, it may be predicted that such weather will last for several days. Again, if, after a long-continued prevalence of s.w. winds, the n.e. wind should set in, it is highly probable that e. winds will prevail for some time; so that, if the season be winter, a continuance of frost, and perhaps snow, may be looked for; but if mid-summer, the weather will become dry, warm, and bracing. But if e. winds have been unusually predominant in autumn, and s.w. winds begin to prevail in the end of Nov. or beginning of Dec., it is most probable that the weather will continue exceptionally mild, with frequent heavy storms of wind and rain, till about Christmas.

WEAVE, v. *wēv* [Dut. *weven*; Icel. *vefa*; Dan. *væve*, to weave: Ger. *weben*, to move to and fro, to weave: Skr. *vap*, to weave]: to form in a loom, as cloth; to unite by interlacing or intertwining; to entwine; to work at the loom; to devise or construct, as a story or plot. WEAV'ING, imp.: N. the act or art of forming cloth in a loom. WOVE, pt. *wōv*, did weave. WOVEN, pp. *wō'vn*. WEAVER, n. *wēv'ēr*, one who or that which weaves; a horse that habitually shakes its head from side to side as the shuttle of a loom. WEAVER-BIRD, a tropical bird which weaves or plaits its nest of twigs, grass, and other fibres.

WEAVER, *wēv'ēr*, AARON WARD: naval officer: b. Dist. of Columbia, 1832, July 1; son of William Augustus W. (1797–1846), naval lieut. He entered the U. S. navy as midshipman 1848, May 10; graduated from the Naval Acad. and became passed midshipman 1854, June 15; was commissioned lieut. 1855; cruised on the African coast in the sloop *Marion* 1858–9, pursuing slavers. In the blockade of the Confederate ports he first commanded the *Susquehanna*, and took part in the capture of Fort Hatteras and Fort Clarke in Hatteras Inlet, of Port Royal, Fort Beauregard, Fort Walker, and Fort Pulaski; also in the capture of Norfolk, Va. Commissioned lieut.-commander 1862, he commanded the *Winona*, gun-boat, in the w. Gulf squadron 1862–3; and participated in the battles of Port Hudson, 1862, Dec., and of Plaquemines, and in the taking of Port Hudson. In the n. Atlantic blockading squadron he commanded the gun-boat *Chippewa* 1864, and took part in the first attack on Fort Fisher; and, while commanding the *Mahopac*, he took part in the capture of that place, and was present at the fall of Charleston and at the fall of Richmond. After the war he was commandant of the Boston navy-yard, in the mean time reaching the rank of commander; 1870–1 he commanded the monitor *Terror*, and later commanded the *Dictator*; was commissioned capt. 1876, commodore 1886.

WEAV'ER, JAMES B.: politician: b. Dayton, O., 1833, June 12. He graduated in the law school of Ohio Univ., Cincinnati, 1854, and began practice. At the beginning of the civil war he entered an Io. regt. as private soldier, was elected lieut., and succeeded to the rank of major 1861, Oct. 3. On the battle-field of Corinth the command of the regt. devolved on him, both col. and lieut.col. having fallen. He received the commission of col. 1862, Mar. 12, and was

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brevetted brig.gen. 1865, Mar. 13. Returning to his law practice, he became dist.atty. for the 2d judicial dist. of Io. 1866; was internal-revenue assessor 1867-73; then was editor of the *Iowa Tribune* in Des Moines, and was representative in congress 1879-81. As candidate of the green-back-labor party, 1880, for the presidency of the United States, W. received 307,740 votes; he was again representative in congress 1885-88.

WEAVER-BIRD: bird of the genus *Ploceus*, family *Fringillidæ*, the 'finches,' and sub-family *Ploceinæ*. The name has reference to the remarkable structure of the nests of these birds, which are woven in a very wonderful and interesting manner of various vegetable substances. The *Ploceinæ* are natives of warmer parts of Asia, Africa, and Australia; none being found in Europe or America. They are small birds, with strong conical bill, the ridge of which is slightly curved, the tip entire; claws large and very long; wings pointed, first quill remarkably short. There is great diversity in the nests constructed by different species. One of the best-known species is the **PHILIPPINE WEAVER** (*P. Philippinus*), the **BAYA** (q.v.) of India.—Many of the other weaver-birds construct nests on the same plan—pouches elongated into tubes, entrance from below; those of some are kidney-shaped, and the entrance is in the side. They very generally suspend their nests in the same way from the extremities of branches, and often prefer branches which hang over water, probably as affording further security against monkeys, squirrels, snakes, and other enemies. Social habits are prevalent among them, and many nests of the same species are often found close together. Some of the birds attach the nest of one year to that of the year preceding—e.g., the *Ploceus pensilis* of Madagascar, which sometimes thus makes five nests in succession, one hanging to another. Some African species build their nests in company, the whole forming one structure. Thus, the **SOCIAL** or **REPUBLICAN W.** of s. Africa (*Ploceus socius* or *Philoterus lepidus*) constructs a kind of umbrella-like roof, under which 800 or 1,000 nests have been found, the nests like the cells of a honeycomb, and arranged with wonderful regularity. An acacia with straight smooth stem, such as predaceous animals cannot easily climb, is often selected by the bird-community. When the situation is chosen, the birds begin by constructing the roof, which is made of coarse grass, each pair afterward building its own nest, which is attached to the roof. As new nests are built every year, the weight of the structure often becomes so great as to break down its support.—*Textor erythrorhynchus* is a bird of the W. group, commonly seen in s. Africa accompanying herds of buffaloes, and feeding on the bots and other insects which infest them: it alights on their backs to pick them out of the hide. The bird is often of great use to the buffalo in another way, by giving warning of the approach of an enemy.—The **Whydaw Birds** (q.v.), or **Widow Birds**, also belong to the group of *Ploceinæ*.

WEAVING.

WEAVING: art by which threads or yarns of any substance are interlaced to form a continuous web; probably the most ancient of the manufacturing arts, for clothing was always a first necessity of mankind. For the general methods of weaving, see **LOOM**. The art has been developed for various adaptations in a multitude of ingenious variations.—The simplest form of weaving is employed in making the mats of uncivilized nations: these consist of single untwisted fibres, usually vegetable, arranged side by side to the width required, and of the length of the fibres themselves, which are tied at each end to a stick, which is so fixed as to keep the fibres straight and on the same plane, as in fig. 1. Then the weaver lifts up every



Fig. 1.

alternate one of these longitudinal threads, and passes under it a transverse one, which he first attaches by tying or twisting to the outermost fibre of the side he commences with, and afterward in the same way to that on the other side, when it has passed through the whole series. The acquisition of the art of spinning threads of any length enables more advanced nations to give great length to the warp, or series of threads which are first arranged, and to pass the weft or transverse thread forward and backward by means of a shuttle, without the necessity of fixing at the sides. That kind of weaving which consists of passing the weft alternately over and under each thread of the warp is called *plain* weaving, and a transverse section of the web would be represented by fig. 2; but if the weaver takes up first one and then two threads alternately of the warp series, and passes the weft under them for the first shoot



Fig. 2.

of his shuttle, and raises those which were left down before for the second shoot, he produces a cloth with a very different appearance, called **TWILL** (q v.), many varieties of which may be produced by varying the numbers missed or taken up—e.g., one and three, instead of one

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and two. The simplest form of twill, viewed transversely, would be represented by fig. 3.



Fig. 3.

There are few arts which require more patience or skill than weaving. As many as 1,000 to 2,000 threads often constitute the warp; and these threads may be so varied in quality (see *YARN*) as to produce many varieties of fabric. From that cause alone, there are almost infinite variations. Many may be produced by the order in which the threads are lifted for the passage of the weft—that of itself can also vary as much or more in its quality and other circumstances, so that the inventive genius of the weaver finds incessant opportunities for its display, and nice arithmetical calculations are required in estimating and allotting the numerous threads to the endless variety of patterns constantly passing through the looms: see the technical treatises—e.g., Watson's *Theory and Practice of the Art of Weaving*; and elaborate treatises by the French weavers. There is no branch of manufacture in which inventions and improvements are more rapidly succeeding each other than in weaving; but, as a rule, they are of minor importance, and rarely affect the general principles of the process. In 1867, however, *Convex* weaving by machinery was introduced; a loom for this purpose having been invented after long effort, which does the work as well as the hand-loom and ten times as fast. The principle of a constant length of travel for the shuttle was adopted for simplicity; but as it is necessary, in weaving the gores, that the weft-thread should pass through only a part of the breadth of the warp, the Jacquard has been employed for taking up the portion of the warp required to be woven in that part.

WEAZEN, a. *wē'zn* [see *WIZEN*]: thin; sharp—as in *weazen-faced*.

WEB, n. *wēb* [from Eng. *weave*: Dut. *webbe*; Sw. *väf*; Dan. *væv*; Ger. *gewebe*; Icel. *vefr*, what is woven, a web]: that which is woven; the whole piece of cloth woven in a loom; something resembling such a web; an extensive roll of paper, as used in printing; webbing; a tissue or texture formed of threads interwined; a very fine texture spun by a spider for catching flies; the membrane which unites the toes of many water-fowl; in *OE.*, a kind of dusky film that hinders the sight (see *PIN AND WEB*): *V.* to cover with a web. **WEBBED**, a. *wēbd*, having the toes united by a membrane. **WEB'ING**, n. a strong coarse fabric of hemp, 2 or 3 inches in width, used for supporting the seating of stuffed chairs, sofas, etc., for saddle-girths, etc. **WEB'BY**, a. *-bī*, pertaining to or resembling a web. **WEB-FOOTED**, a. having the toes united by a membrane, as a duck. **WEBSTER**, n. *wēb'stēr*, an old word for *weaver*, properly a female weaver.

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WEBB, *wěb*, ALEXANDER STEWART, LL.D.: soldier and educator: b. New York, 1835, Feb. 15; son of James Watson W. (q.v.). He graduated at West Point 1855, and was commissioned in the artillery; served in Fla. and Minn.; was asst. prof. at West Point 3 years; commissioned 1st lieut. 1861, Apr.; capt. May; then maj. of a R. I. artillery regt. Sep. 14. He was in the first Bull Run battle; then did duty in the defenses of Washington; served through the Peninsular campaign of the Army of the Potomac 1862; was chief of staff in the Md. and Rappahannock campaigns; became brig.gen. of vols. and commanded a brigade at Gettysburg, and there was wounded; he received from Gen. Meade a bronze medal for 'distinguished personal gallantry on that ever-memorable field;' commanded a division in the Rapidan campaign; served through the Wilderness campaign, and was severely wounded at Spottsylvania 1864, May; was Gen. Meade's chief of staff in the operations before Petersburg. Gen. W. acted as inspector-gen. of the milit. dist. of the Atlantic 1865-6; then till 1868 was prof. at West Point; became lieut.-col. 44th U. S. infantry 1866, and commanded the 5th milit. dist. 1869. He resigned from the army 1870, Dec.; was brevetted maj.gen. U. S. army 1865; became pres. of the College of the City of New York 1869, July 21.—He pub. (1882) *The Peninsula, McClellan's Campaign of 1862*, and wrote articles on the civil war for the *Century Magazine*.

WEBB, *wěb*, CHARLES: soldier: 1724, Feb. 13—1794; b. Stamford, Conn. In 1758 he was elected to the Conn. legislature, and was continued in it more than 20 years. He served in the French war and rose to the rank of capt.; in 1775, May, he was sent by congress to inspect the works at Ticonderoga; and 1775, July, was commissioned col. of the 19th regt. He took part in the battles of Long Island, White Plains, and Whitemarsh. He resigned his commission 1778.

WEBB, CHARLES HENRY: author: b. Rouse's Point, N. Y., 1834, Jan. 24. In boyhood he left his home and spent three years on a whaling-vessel. His parents having in the mean time settled in Ill., he returned to his father's home there. He was engaged in commercial business, and was a banker and broker in New York 1856-60. He was employed in an editorial capacity on the *New York Times* 1860-63, and the *San Francisco Bulletin* 1863-4; was editor (1864-66) of the *Californian*, a weekly journal in which 'Mark Twain' and Bret Harte first achieved reputation. Under the pseudonym 'John Paul' he has contributed very many articles to the *New York Tribune*: a series of these has been pub. under the title *John Paul's Book*. He invented and patented, 1868, 'Webb's adder,' an adding-machine which came into practical use; in 1874 he invented a cartridge-loading machine, sold by the Remingtons. He showed an unusual gift as a facile and entertaining writer both in prose and in verse. He produced two comedies in San Francisco: *Our Friend from Victoria* (1865); *Arrah-na-Pogue*, burlesque on one of Boucicault's plays.

Among his published volumes are: *Liffith Lank* (travesty of Charles Reade's *Griffith Gaunt*); *St. Twel'mo* (travesty of Miss Evans's *St. Elmo*); *Parodies, Prose and Verse*; *Vagrom Verse*.

WEBB, GEORGE JAMES: musician: 1803, June 24—1887, Oct. 7; b. near Salisbury, Wiltshire, England. In 1830 he came to this country, and settled in Boston as organist and teacher of music. On the founding of the Boston Acad. of Music, W. was appointed one of the directors. In 1871 he removed to Orange, N. J., and taught his new method of voice culture. In collaboration with Chester G. Allen he wrote *Voice Culture*, and was the author of a number of other works on music. He died at Orange.

WEBB, JAMES WATSON: journalist: 1802, Feb. 8—1884, June 7; b. Claverack, N. Y.; son of Samuel Blatchley W. (q.v.). He was educated at Cooperstown, N. Y.; was commissioned 2d lieut. in the U. S. army 1819, 1st lieut. 1823; was adjt. of the 3d regt. 1826; resigned 1827, and became editor of the *New York Courier*, which 2 years later was consolidated with the *Enquirer*, W. continuing to be editor till 1861, when the *Courier and Enquirer* was merged in the *World*. His newspaper was an influential whig organ. W. was wounded in a duel with Thomas F. Marshall, of Ky., 1842, June; pleaded guilty on indictment for the act; was tried and condemned to imprisonment; but after 2 weeks was released. He was appointed minister to Austria 1849, but the senate refused to approve the appointment. He declined the offer of a brig.-generalship at the opening of the civil war, having solicited a maj.-general's commission. As minister to Brazil 1861—70, he settled long-standing claims of U. S. citizens against the govt. of that country. W. pub. *Altowan, or Incidents of Life and Adventure in the Rocky Mts.* (2 vols. 1846); *Slavery and Its Tendencies* (1856); and a pamphlet on *National Currency* (1875).

WEBB, MATTHEW: swimmer: 1848, Jan. 18—1883, July 22; b. Irongate, Shropshire, Eng. He attracted the attention of the public in 1875, by swimming the Thames from Blackwall to Gravesend, and two weeks afterward swimming from Dover to Ramsgate in 8 $\frac{3}{4}$ hours. These efforts were preparatory to his feat of swimming the English Channel, 1875, Aug. 24, in 21 hours. In 1883, June, he came to this country for the purpose of swimming through the whirlpool of the Niagara river. He made the attempt July 22, but was drowned. From injuries on his head, it is thought that he struck a rock and became unconscious. He was at one time capt. of a merchant-vessel, and had received one of the first medals of the Royal Life-saving Society.

WEBB, SAMUEL BLATCHLEY: soldier: 1753, Dec. 15—1807, Dec. 3; b. Wethersfield, Conn.; descendant of Richard W., native of Gloucestershire, England, who, 1632, was made freeman of Boston, and, 1635, was associated with the Rev. Thomas Hooker in founding the settlement of Hartford, Conn. W. was sec. of Silas Deane (q.v.), his

step-father, and thus came to be active in the movements that preceded the revolutionary war. When the news of the battle of Lexington reached Wethersfield, W. set out immediately for Boston; and was in the battle of Bunker Hill, where he was wounded: he earned and received the praise of gallantry in general orders. A letter written by him to Silas Deane, and containing a description of the battle, is preserved in the archives of the Conn. Historical Soc. His first appointment in the military service followed soon, and he became aide to Gen. Israel Putnam; 1776 he was promoted lieut.col., and was appointed aide and sec. to Gen. George Washington. W. drafted the general order to the troops around New York promulgating the Declaration of Independence, 1776, July 9. When a letter was received a few days later, from Gen. Howe, addressed to the American commander-in-chief in the style 'George Washington, Esq.,' W. and another of Washington's secretaries sent it back unopened for its failure to recognize Washington's official rank. He took part in the battles of Long Island, White Plains, Trenton, and Princeton, and was wounded at the first two. He took command, 1777, of the 3d Conn. regt., which he had raised and organized at his own charges. With this regt. he served in the disastrous expedition of Gen. Samuel H. Parsons to Long Island, and with his entire command was captured by the enemy's fleet 1777, Dec. 10. He was held prisoner till 1780. Then he was assigned to command a brigade of light infantry, with brevet rank of brig.gen. W. was one of the founders of the Soc. of the Cincinnati, 1783. He settled at Claverack, Columbia co., N. Y., 1789.

WEBB, THOMAS: 1724-1796, Dec. 20; b. England. He was an officer in the Brit. army, and served at the siege of Quebec, where he lost his right eye. In 1765, under John Wesley's preaching, he became a convert to his faith, and was licensed to preach. In 1766 his regt. was again ordered to this country, and he was stationed at Albany, N. Y. Here he preached in his own house. In 1767 he went to New York, and with Philip Embury preached for the society of Methodists formed there by Barbara Heck; the same year he established the first soc. in Philadelphia, preaching for it until 1769. He was subsequently retired from the army with rank of capt., and thereafter devoted himself to missionary work. He died suddenly at Bristol, Eng., where he had built a chapel at his own expense, and in which he preached.

WEBB, THOMAS SMITH: 1771, Oct. 30-1819, July 6; b. Boston, Mass. He learned printing at Boston, and afterward removed to Keene, N. H., where he worked at his trade, and where he became a Mason. In 1793 he established himself in business in Albany, N. Y.; and 1797 published *The Freemason's Monitor, or Illustrations of Masonry*. This he afterward revised, and it became, and still is, authority among Masons. He also published a number of Masonic poems and songs. He was originator of the grand encampment of Masons in the United States. He died at Cleveland, Ohio.

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WEBB, WILLIAM HENRY: ship-builder: b. New York, 1816, June 19. He was educated in the grammar school of Columbia Coll., New York; learned the trade of ship-building in his father's yard; became manager of his father's business 1843. Under W.'s management were built many ships of war for the United States and foreign govts., as the *General Admiral*, steam-frigate for Russia, 2 steam-frigates for Italy, the *Dunderberg*, iron-clad ram for the U. S. govt. In 1890, July, work was begun on the erection of buildings at Fordham, N. Y., for an 'academy and home for ship-builders,' to be founded by W. The objects of the academy and home are: 1. Relief of 'aged, indigent, and unfortunate men' who have been engaged in any department of ship-building in the United States; relief also of their widows. 2. Providing for American young men of good character gratuitous education in the profession of ship-building and machine-engine building, together with free maintenance. He died 1899, Oct. 30.

WEBB CITY: city in Jasper co., Mo.; on the St. Louis and San Francisco, the Kansas City, Fort Scott and Memphis, and the Missouri Pac. railroads; 5 m. n.w. of Joplin. It is in a fruit-growing and farming region, and has valuable deposits of lead and zinc ores. There are 8 churches, graded schools, several smelting-works, 1 nat. bank (cap. \$50,000), 2 state banks (cap. \$50,000), and 3 daily and 2 weekly newspapers. Pop. (1900) 9,201.

WEBER, n. *wē'bér* or *vā'bér* [after Wilhelm Weber, the German physicist]: the unit of quantity of electricity now called *coulomb* (see UNITS, SCIENTIFIC).

WEBER, *vā'bér*, ALBRECHT FRIEDRICH: philologist: b. Breslau, Prussia, 1825, Feb. 17; son of Friedrich Benedikt W., prof. of national economy (1774–1848). W. studied philology, classical and oriental, at Breslau, at Bonn, and at Berlin under Bopp; and was appointed, 1856, prof. of ancient Indian languages and literature in the Berlin Univ. His writings on the languages of India and the East are very numerous. His two most important works are an ed. of the *White Yajurveda* (1849–59, 3 vols.), and *Indische Studien* (1849–85, 17 vols.). He pub., 1882, *Ueber den Kunakshakshakausikāditya des Dharmasāgara*, and *Ueber das Uttamacaritrakathānakam*. He died 1901, Dec. 1.

WE'BER, CARL MARIA FRIEDRICH ERNST VON: musical composer of great eminence: 1786, Dec. 18–1826, June 4 or 5; b. Eutin, in Holstein. Musical and dramatic talent had been hereditary in his family for generations; his father, a baron, by turns officer in the army of the Palatinate, finance-minister of the Elector of Cologne, music-director to the prince bishop of Eutin, director of opera at Lübeck, and head of a company of strolling players, led an irregular and thriftless life. Young W. showed early a genius for music, but his instructors were often changed by his father's change of residence. The teachers to whom he owed most were Hauschkel at Hildburghausen, Michael Haydn at Salzburg, and Valesi and Kalcher at Munich. His father's impatience and lack of

judgment were injurious to him in many ways, particularly in bringing him before the public prematurely as a musical prodigy. From this course of life, however, the child drew one advantage, that of early familiarity with the stage; and he seems to have instinctively developed himself as a gentleman. At the age of 13 he composed an opera, *Die Macht der Liebe und des Weins*. The next year his second opera, *Das Waldmädchen*, was brought out, without success at first; but was afterward far better received than he himself thought it deserved. The next effort of the young opera-composer was *Peter Schinoll und seine Nachbarn*, composed at Salzburg 1801, performed at Vienna with indifferent success. At Vienna he became acquainted, 1803, with Joseph Haydn and the Abbé Vogler, and studied under the latter. In 1804 he left Vienna, to be conductor of the opera at Breslau, and while resident there composed the greater part of his opera of *Rübezahl*. In 1806 W. was with Prince Eugene of Würtemberg at his court of Carlsruhe in Silesia, where he composed two symphonies and three concertos. In 1807 he went to Stuttgart, as private sec. to Duke Ludwig, becoming also musical instructor to his children; and while there he composed the opera of *Silvana*, and a cantata, *Der erste Ton*, besides overtures, choral pieces, and pianoforte works. Falling into disfavor through his own somewhat irregular life, and into pecuniary embarrassments—the result of his father's recklessness and embezzlement of the duke's money—he was dismissed from the court of Würtemberg, and resided successively in Mannheim, Heidelberg, and Darmstadt, at the last place composing his operetta *Abu Hassan*. He then made a musical tour through Germany, during which his concerts were everywhere well attended. He was director (1813–16) of the opera at Prague, which he entirely remodelled; and during his residence in the Bohemian capital composed *Kampf und Sieg*, and many other songs, including the noble national series from Körner's *Leier und Schwert*, which had much influence in rousing patriotic sentiment during the war of liberation.

In 1817 he was invited to form a German opera at Dresden; and there, during the remainder of his life, he held the post of *Kapellmeister* to the king of Saxony. To this period belong his most important compositions, including *Preciosa*, *Der Freischütz*, *Euryanthe*, and *Oberon*. None of these works, however, were first brought out in Dresden. The music to Wolff's *Preciosa*, whose subject is from a novel by Cervantes, was produced first on the Berlin stage, where it made a powerful impression. The author's *chef-d'œuvre*, the opera of *Der Freischütz*, the libretto of which was written by the composer's friend Friedrich Kind, also first saw the light in the Prussian capital 1822. It was a great success: its novelty and beauty, as well as the deep thought contained in it, excited an extraordinary sensation throughout Germany, which soon extended to France and England. *Euryanthe*, produced in Vienna 1823, was not quite so warmly received: bearing more the impress of labor and cultivation, and less

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that of the composer's natural vein of romance, it has never been in such general favor as its predecessor. *Oberon* was written in prospect of a visit to London, to a libretto supplied by Mr. Planché. When W. set out for England, he was already struggling against mortal disease. He appeared at Covent Garden Theatre as conductor of a selection from *Freischütz*, 1826, Mar. 8; and on Apr. 12 also he conducted, on the first appearance of *Oberon*, with applause on both occasions, incessant and uproarious. At his benefit concert May 26, he was hardly able to go through the duty of conductor; and June 5 he was found dead in bed in the house of Sir George Smart, whose guest he was. He was interred in the Rom. Cath. church, Moorfields; but 1844 his body was removed to Dresden; and a statue of him by Reichel was erected 1860 in front of the Dresden Theatre. W. was married 1818 to Carolina Brandt, operatic singer of some note, daughter of Brandt the violinist; and he left children by her.

The verdict of posterity, as well as of his contemporaries, has placed W. in the first rank of musical composers. He was the first to use those bold effects of harmony and modulation whose introduction forms an era in the history of music. He was indeed the creator of 'romantic opera.' In his operas the spirit of the romantic school appears in its brightest and most captivating form; and the overtures are masterpieces of imagination, each presenting an outline of the work to which it pertains. Besides the above operas and songs, his musical works are numerous, comprising concertos for the pianoforte, clarionet, oboe, bassoon, and violoncello, symphonies, and overtures, one of the most beautiful and characteristic of these being the overture to the *Beherrscher der Geister*. Among his posthumous writings is an autobiography. His Life was written by his son Baron Max Maria von W., 1864 (transl. by Simson). See also Jähn's *W.* (1873); and *Weber*, by Sir Julius Benedict (London 1880).

WEBER, WILHELM EDUARD: German physicist: 1804, Oct. 24—1891, June 23; b. Wittenberg, Prussia. He was appointed prof. of physics at Göttingen 1831; retired from the professorship 1837, and became prof. at Leipsic; in 1849 he returned to his post at Göttingen, where he remained until his death. He was noted especially for his researches in magnetism and electricity. He was one of seven 'liberal' professors excluded from Göttingen 1837. In connection with his elder brother, Ernst Heinrich W. (1795–1878), he produced *Die Wellenlehre* (1825); with his younger brother, Eduard Friedrich W. (1801–71), *Mechanik der Menschlichen Werkzeuge* (1836); and with Karl Friedrich Gauss, *Resultate aus den Beobachtungen des magnetischen Vereins* (1836), and *Atlas des Erdmagnetismus* (1840).

WEBER'S LAW.

WEBER'S LAW: formulation (by Prof. Ernst Heinrich Weber) of a certain constant ratio between differences in sense-perception under varying increments or reductions of stimulation: e.g., we cannot recognize by the touch-sense slight differences in weight when the weights compared are heavy, though we should be perfectly able to make the distinction if the weights were light. The plain inference is that the greater the intensity of the original stimulus the greater must be the increase of stimulus to make the difference perceptible in the resulting sensation. W. L. is the scientific formulation of this conclusion: it is that, in order that the sensation-difference may remain unchanged, the increase of stimulus must maintain *the same proportion* as the intensity of the preceding stimulus. The smallest perceptible difference is therefore not absolutely the same, but it remains relatively the same—i.e., the same fraction of the preceding stimulus. Thus, if we can distinguish 16 oz. from 17 oz. we can also distinguish 32 oz. from 34 oz.; the addition being in each case $\frac{1}{16}$ of the preceding stimulus.

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WEBSTER, *n.* *wěb'stēr*: in *OE.*, a weaver, particularly a female weaver.

WEBSTER: village and tp., Worcester co., Mass.; on the French river, and on the New York and New England and the Boston and Albany railroads; 16 m. s. of Worcester, 58 m. w.s.w. of Boston. It is one of the two co. seats, and is widely known for its manufacturing industries, which include iron and brass foundry products, woolen, cotton, and linen goods, yarn, and shoes. It has several churches and public schools, public library, and 1 weekly newspaper. Pop. (1880) 5,696; (1890) 7,031; (1900) 8,804.

WEBSTER, *wěb'stēr*, DANIEL, LL.D.: statesman: 1782, Jan. 18—1852, Oct. 24; b. Salisbury (now Franklin), N. H.; son of Ebenezer W. (q.v.), descendant of Thomas W., who settled in N. H. 1636. After receiving a very elementary education at home, he passed a few months in Phillips Exeter Acad., 1797; then prepared for college under the Rev. Samuel Wood at Boscawen, N. H.; studied at Dartmouth College 1797–1801, meanwhile conducting a school in the winter. After graduation he studied law, and was admitted to the Boston bar 1805; but meanwhile was principal of an acad. at Fryeburg, Me., and copyist in the office of the register of deeds there. He commenced practice at Boscawen, but soon removed to Portsmouth, N. H. He was active in politics at this time as a federalist, and came into general notice first through a strong speech in opposition to war with Great Britain, which won for him nomination and election to congress 1812. In the house of representatives he served on the committee of foreign affairs, and on the floor was prominent in the debates on the war with England and on the finances: he favored an increase of the U. S. navy and rescission of the embargo. In a speech that showed mastery of the data of economic science he vigorously opposed the act to create a new U. S. bank, and was the principal agent in procuring its defeat; so, too, 1816, he favored and procured the passage of a resolution for a return to specie payments.

He removed to Boston 1816, and there resumed the practice of law, rising immediately to the highest rank in his profession. His argument in the Dartmouth Coll. (q.v.) case, which he won on appeal to the U. S. supreme court, 1818, Mar. 10, brought to him retainers in many of the great causes of the time. He was a leading member of the Mass. constitutional convention 1820; the same year he delivered his memorable oration at Plymouth, Mass., on the 200th anniversary of the landing of the Pilgrims. He was again representative in congress 1823–27, and then entered the U. S. senate to fill an unexpired term. He was re-elected again and again to the senate till 1841. The memorable acts of his career in the house after re-entering it, 1823, were: a statesmanlike speech on the Greek revolution 1824, his carrying a bill for revision of the federal laws, and his vigorous advocacy of the calling of a congress of representatives of American states at Panama to provide for the consolidation and independence of the Spanish-American republics. His famous

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oration at the laying of the corner-stone of the Bunker Hill Monument, and his eulogy of Adams and Jefferson, belong to this period. In the senate his first speech was in opposition to a comparatively high tariff on woolen fabrics, but he cast his vote for a bill (which became law) for a rather high tariff; and later he was a steadfast advocate of protective duties. His great speech in reply to Senator Hayne was delivered in the senate 1830, Jan. 26-7. It fell to W. to defend the northern states against the attack of Hayne, who, in debate on the survey of the public lands, had made a bitter attack on the people of the north, and especially of New England, and who first gave expression in the federal legislature to the doctrine of nullification. Though strongly opposed to Pres. Jackson on political or partizan issues, W. cordially supported Jackson in his measures to suppress the attempt to carry the nullification doctrine into effect. He advocated, in a great speech, renewal of the U. S. Bank's charter, 1832, May; and the same year, while supporting Henry Clay's candidacy for the office of pres., opposed the compromise tariff bill and voted for the 'force bill' aimed against the nullifiers of the south. When the whig party was organized, 1834, W. was its principal leader in the north. He was active 1840 in the presidential canvass, working for the whig nominee, Gen. William H. Harrison; and Harrison, when elected, chose W. for sec. of state, 1841, Mar.; after Harrison's death, W. continued to hold the office under Pres. Tyler. His diplomatic ability was manifested during his secretaryship in the negotiation of the Ashburton treaty with Great Britain, 1842, Aug. 9.

Resigning office 1843, May, W. returned to the practice of law in Boston, and declined a seat in the senate. When the Bunker Hill Monument was completed, he delivered the oration at its formal dedication, 1843. He was already (1840) the choice of the Mass. whigs for the presidency; again, 1844, he was a favorite candidate; but cordially supported Henry Clay, and opposed the admission of Texas to the Union as a state. Returned to the senate 1845, Dec., he opposed the Mexican war; but his son Edward, maj. of a Mass. regt. of vols., died in the military service at Mexico. Again W. was before his party in national convention for nomination to the presidency 1848, but Gen. Zachary Taylor won the prize. The annexation of Mexican territory and the admission of Texas had brought complications and perils which filled W. with alarm for the perpetuity of the Union; therefore in the interest of peace he favored compromise measures in relation to the existence and extension of slavery, and defended from that point of view the Fugitive Slave Law—so losing the approval and support of his most attached friends in the whig party. After Pres. Taylor's death, Pres. Fillmore chose W. sec. of state 1850, July; in that term of office he conducted with characteristic energy and ability the correspondence with the Austrian govt. in the *Martin Kotzta* case. In Fillmore's administration, W. vigorously enforced the laws of the United States against filibustering;

but when the followers of the filibuster chief Narciso Lopez fell into the hands of the Spanish govt. in Cuba, and were deported to Spain, W. interceded for their pardon. He also during the same term of office had to maintain the rights of U. S. citizens against British pretensions in Central America and on the N. American fishing-grounds; he negotiated a treaty of reciprocation between the United States and Canada. His last great political speech was made in Boston 1850, Mar. 7, advocating compromise on the slavery question: it aroused public indignation in Mass.; and, as events proved, was a political mistake. W.'s last public speech was at the laying of the corner-stone of the additions to the Capitol buildings in Washington, 1851, July 4; his last forensic effort was in the trial of the Good-year patents case at Trenton, N. J., 1852, Jan. In the same year he was defeated by Gen. Winfield Scott in the candidacy for the whig presidential nomination: this result was doubtless a serious disappointment to W. In failing health he left Washington for his home by the sea at Marshfield, Mass.; and there, within three weeks, he died. His grave is at Marshfield.

W. had abilities of the highest order, but they were not those of a party leader. His lot was cast in a time when questions portentous in their moral and political bearings filled the air—questions within which lay unseen the germ of terrific conflict and of vast and astounding change. The portents he seems to have recognized, but to have failed in his attempt to read their deepest meaning. He was a statesman, an accomplished diplomat, and an expounder of constitutional law. Few grander orators have lived: he despised mere rhetoric; his sentences were simple in form, and often massive in meaning; his whole style was direct, and his arguments were such as to impress alike the learned and the unlearned. Indeed, his power of stating a case was such that his mere statement frequently had all the force of a sufficient argument.—See *W.'s Works*, with sketch by Edward Everett (6 vols. Boston 1851); *W.'s Private Correspondence*, ed. by his son Col. Fletcher W. (2 vols. Boston 1856); Geo. Ticknor Curtis's *Life of W.* (2 vols. New York 1870); H. C. Lodge's *Webster*, in Amer. Statesmen Series (1883).

WEB'STER, EBENEZER: patriot: 1739–1806; b. Kingston, N. H.; father of Daniel W. (q.v.). He served in the 'old French war' as private soldier; was, 1761, one of the earliest settlers of Franklin (originally Salisbury), N. H., where he was farmer and innkeeper. He led the Salisbury militia to Cambridge to join Washington's army before Boston 1775, and served in the army till the end of the war. For several years he represented his town in the N. H. assembly and senate, and 1791 till his death was a judge of the common pleas court of Hillsboro co., N. H.—W. recognized in his son Daniel extraordinary gifts; and in straitened pecuniary circumstances made great sacrifices to give him a collegiate education.

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WEBSTER, JOHN: dramatist: appearing as a writer for the stage first in 1601. His history as rehearsed by Algernon C. Swinburne is, that he published 1624 the city pageant for that year, 'invented and written by John Webster, merchant tailor': outside of the period comprised between these two dates there is no record of act or work of his. There were pub., 1607, two comedies and a tragedy 'written by Thomas Decker and John Webster.' His dramatization of the life of Lady Jane Grey is pronounced to have been probably 'a rough piece of patchwork by W. and others:' the play is not extant. But, 1612, W. 'stood revealed as a tragic poet and dramatist of the very highest class,' by his tragedy *The White Devil*, known also as *Vittoria Corombona*. W.'s *Duchess of Malfi* (Amalfi) Swinburne declares to be 'one of the imperishable landmarks of literature.' Many years later came *Appius and Virginia* and *A Cure for a Cuckold*.—W.'s works were first collected 1830 and pub. by the Rev. Alexander Dyce.

WEBSTER, JOSEPH DANA: soldier: 1811, Aug. 25—1876, Mar. 12; b. Old Hampton, N. H.; son of Josiah W., minister at Hampton 1808–37. Graduating at Dartmouth 1832, he studied law; became clerk in the war dept., Washington, and was made U. S. civil engineer 1835; was commissioned 2d lieut. of topographical engineers 1838; served in the Mexican war; resigned from the army, with rank of capt., 1854, to practice in Chicago as civil engineer. He perfected a system of sewerage for Chicago, the execution of which necessitated raising the grade of a large part of the city and involved many great and novel engineering feats. At the beginning of the civil war he was charged with the construction of fortifications at Cairo, Ill., and Paducah, Ky.; became col. of an Ill. artil. regt. 1862; as chief of Gen. Grant's staff was present at Fort Henry and Fort Donelson; at Shiloh he was chief of artillery. He was commissioned brig.gen. 1862, Nov. 29, and served as milit. gov. of Memphis and as milit. supt. of railroads; he was again Gen. Grant's chief of staff at Vicksburg, and held a like post under Gen. Sherman from 1864 till the end of the war. Having been brevetted maj.gen. of vols. 1865, Mar., he retired from the army and went back to Chicago; there he was assessor of internal revenue 1869–72, afterward asst. U. S. treasurer, and finally collector of revenue.

WEBSTER, NOAH, LL.D.: lexicographer: 1758, Oct. 16—1843, May 28; b. Hartford, Conn.; descendant of John W., who prior to 1660 was one of the magistrates of Conn. and gov.; descendant, on his mother's side, of William Bradford, second gov. of Plymouth colony. He was a student at Yale when the revolutionary war began, and quit his studies to serve in a company of militia commanded by his father; he graduated at Yale 1778; studied law and was admitted to the bar, but did not begin practice. He then took charge of a school at Goshen, N. Y., and there wrote his *Grammatical Institute of the English Language* (Hartford 1783–85, 3 parts). In this work was contained *Webster's Spelling Book*, which, published as a separate work, was circulated in enormous editions. The

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Speller is still in use, and more than 60,000,000 copies have been sold. The royalty of one cent a copy on the *Speller* afforded W. an income during the years when he was occupied with his great *Dictionary*. His series of letters under the signature *Honorius* aided powerfully in winning public favor for the proposal to give to the revolutionary soldiers pay for 5 years beyond their term of enlistment. He pub. 1784 a pamphlet, *Sketches of American Policy*, in which he favored greater centralization of govt. He lectured in many cities, 1786, on the English language, and published his lectures 1789—*Dissertations on the English Language*. After the adjournment of the constitutional convention at Philadelphia, he published a pamphlet showing the *Leading Principles of the Federal Constitution*. He was engaged in law practice in Hartford 1789—93; then established in New York a daily federalist newspaper, the *Minerva*. He also wrote and published several other pamphlets on political and financial questions. In 1807 appeared his *Philosophical and Practical Grammar*. He had been collecting and digesting material for his *Dictionary*, but now (1807) entered on that work as his principal occupation. Finding difficulties in etymology, he gave ten years to its study, and prepared a 'synopsis of words in 20 languages' for his own use, which is still in MS. When the great work was near completion, he went to Europe, 1824, to consult scholars and to have access to libraries. The first edition (2,500 copies) was pub. 1828, and was immediately reprinted in England. It added 12,000 words and 40,000 definitions to those in previous dictionaries. This monumental work in its successive editions has had high rank and an unprecedented circulation. Its latest revision and enlargement, under the supervision of Pres. Porter of Yale Univ., appeared 1890—*Webster's International Dictionary of the English Language*. —W. was the first pres. of the board of trustees of Amherst College; was for several years alderman in New Haven, Conn.; was once a judge, and was member of the legislature both of Conn. and of Mass.—See Life, by Scudder (1882).

WEBSTERITE, n. wěb'stér-īt [after Webster, a geologist]: a white or yellowish-white earthy mineral, consisting of hydrous sulphate of alumina, soft, with a fine scaly or fibrous structure—known also as *aluminite*.

WED, v. wěd [AS. *wedd*; Goth. *vadi*, a pledge: AS. *weddian*, to engage, to promise: Ger. *wette*, a wager: Dan. *vedde*, to wager (see also WAGE)]: to engage or pledge one's self, as a husband or wife; to marry; to take for husband or for wife; to join in marriage; to attach firmly; to unite by love or fondness. WED'DING, imp.: N. Marriage (q.v.); nuptial ceremony. WED'DED, pp.: ADJ. pertaining to marriage; closely attached. WEDDING-CAKE, a rich cake, frosted with sugar and variously ornamented, made in honor of a wedding, and cut and distributed, or at least distributed, after the wedding. WEDDING-CARDS, the name and address cards of a newly married couple sent to friends, or the cards of invitation sent out on the occasion of a wedding. WEDDING-DRESS, the garments worn by a

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bride at the marriage ceremony. WEDDING-FAVOR, a bunch of white ribbons, a rosette, or the like, worn by male guests at a wedding. WEDDING-RING, a plain gold ring placed by the bridegroom on the third finger of the bride's left hand at the marriage ceremony. WEDLOCK, n. *wěd'lōk* [AS. *wedlác*, a pledge, a promise—from *wed*, a pledge, and *lác*, a gift]: marriage; matrimony: V. in *OE.*, to marry.

WED'DAHS, or VED'DAHS: see VEDDAH: CEYLON.

WEDGE, n. *wěj* [Dut. *wigge*; Dan. *vægge*; OHG. *weggi*, a wedge]: a piece of metal or wood, thick at one end and tapering to a thin flat edge at the other, used for rending asunder, for compressing, or for raising; one of the mechanical powers; a small bar, as a *wedge* of gold: V. to drive, as a wedge; to compress closely; to force, as a wedge forces its way; to fasten with a wedge or wedges; to cleave or split with a wedge. WEDG'Y, a. -i, resembling a wedge. WEDG'ING, imp. WEDGED, pp. *wějd*. WEDGE-SHAPED, a. shaped like a wedge; cuneate.—The *Wedge* is one of the mechanical powers, and in principle is a modification of the inclined plane. Its normal form is here represented. The power is applied by pressure, or more usually by percussion, to the back B, thus forcing the edge A forward. The wedge is employed for such purposes as splitting wood, fastening firmly the handle of an ax, raising a ship in dry-dock, etc. The investigation on statical principles of the mechanical advantage of the wedge is extremely unsatisfactory—the power, which is scarcely ever a 'pressure,'



being always assumed to be a pressure, and the enormous friction on the sides of the wedge being generally neglected; the theoretical result thus arrived at is that the pressure applied at the back : the resistance or weight : : $\frac{1}{2}$ width of back of wedge : length of side. In the application of the wedge to splitting wood in the direction of the fibres, the split generally extends some distance in advance of the edge of the wedge, and the action of the latter is then a combination of the action of the wedge with that of the lever; in fact, this compound action is found more or less in all applications of the wedge as a cutting or splitting weapon, and tends further to complicate the statical investigation of its mechanical properties. The best and simplest illustrations of the single wedge are axes, nails, plugs, planes, chisels, needles, and all sharp-pointed instruments.

WEDGWOOD, a. *wěj'wúd*: pertaining to or invented by Wedgwood, the potter, as *Wedgwood ware*. WEDGWOOD WARE, or JASPER WARE, a superior kind of pottery, introduced by Josiah Wedgwood (q.v.), 1775, capable of being embellished with brilliant designs in color. It consists of flint, potter's clay, carbonate and sulphate of barytes, and zaffre or some other coloring material. The beautiful classical designs on the earliest productions of this manufacture, many of them executed by Flaxman, are very highly valued.

WEDGWOOD—WEE.

WEDGWOOD, *wěj'wú'd*, **JOSIAH**: creator of British pottery as an art: 1730–1795, Jan. 3; b. Burslem, in Staffordshire. His father was a potter, and very early he was set to work at the same business. His education seems to have been of the scantiest. From the first, his ardor for improvement of the manufacture was conspicuous. His first efforts were directed to the refining of the material, and soon he produced a cream-colored porcelain, which became popularly known as Queen's Ware, from Queen Charlotte, who admired it. Subsequently other improved materials were produced. W. gave not less attention to form and decoration—emulating the grace of the antique models; and the sculptor Flaxman was employed to furnish designs. Thus he raised a rude and barbarous manufacture to a fine art, and speedily amassed an immense fortune. In 1771 he removed his works a little way from Burslem; and to the new site he gave the fanciful name Etruria, as that of the country of old most celebrated for the beauty of its ceramic products. Here he built himself a splendid mansion.

Apart from his eminence in his art, W. was a man of considerable culture. He was a student of natural philosophy. He was a fellow of the Royal Soc. and of the Soc. of Antiquaries, and contributed to the *Philosophical Transactions*. He interested himself in public concerns; and he used his prosperity in a spirit of liberal beneficence.—See his Life (1865) by Llewellyn Jewett; Eliza Meteyard's *Memorials of Wedgwood* (1875); *Wedgwood Handbook* (1875).

WEDLOCK: see under **WED**.

WEDNESBURY, *wěnz'bēr-ĭ*: market-town in s. Staffordshire, in a district abounding in canals, coal mines, and iron-works; 7½ m. n.w. of Birmingham by railway, 136 m. n.w. of London. It was called Weadesbury by the Saxons, and for a long time took precedence, in population and historical importance, of Birmingham and Wolverhampton. The great coal-field of Staffordshire was first worked here. W. contains large works for manufacture of railway plant; it produces edge-tools, coach iron-mongery, locks, screws, gunlocks and barrels, gas and water pipes.—Pop. (1871) of town 25,030; (1881) 24,564—parliamentary borough 68,142; (1891) 25,342.

WEDNESDAY, n. *wěnz'dā* [AS. *Wodnes-dæg*, Woden's day—from *Odin* or *Woden*, a Scandinavian deity, and AS. *dæg*, a day]: the day consecrated to Woden; the fourth day of the week, coming next after Tuesday.

WEE, a. *wē* [identified by Skeat with Eng. *way*, the phrase *way-bit* being still used in prov. Eng. in the sense of *wee bit* or little bit: comp. also the old phrase 'a little *we*,' a little bit, a short space]: in *Scot.* and *prov. Eng.*, little; diminutive: N. in *Scot.*, a short time, or space, as, wait a *wee*.

WEEBO—WEED.

WEEBO, *wē'bō*, or **IBO**, *ē'bō*: small island off the coast of Mozambique, belonging to the Portuguese; about 150 m. s. of Cape Delgado. The town is clean, with neatly-built houses; there are three forts, adapted only for resistance to the natives, mostly a miserable fever-stricken race, between whom and the Portuguese all along the Mozambique coast there seems to be perpetual hostility.—Pop. about 3,000.

WEED, n. *wēd* [AS. *wæd*, a garment: Icel. *vad*, stuff for clothing, a vestment: OHG. *wat*, clothing, armor]: a garment of any kind; now commonly used in the plural, as in the phrase *widow's weeds*, the mourning worn by a widow.

WEED, n. *wēd*: any sudden illness arising from cold or relapse in women after confinement or during nursing. *Weed in the breast*, inflammation of the mammary glands of women during or after confinement, called also mastitis.—

Weed, in diseases of *the horse*, is lymphangitis or inflammation of the large absorbent glands and vessels between the horse's thighs. Sometimes, but rarely, it attacks the corresponding structures between the fore-limbs. It occurs in round-limbed, indifferently bred, hard-wrought horses; appears particularly after a day or two of rest, after exposure to cold, or during imperfect action of the bowels; and is said to depend on more blood being produced than is required to replace the natural waste of the body. It may be identified by lameness, tenderness in the groin, and fever. The horse should be bled, and have a full dose of aloes; and if the pain and tenderness are great, professional advice should be taken; the limb should be bathed for at least six or eight hours continuously in hot water, and then rubbed dry and kept warm. The subsequent swelling will be reduced by saline draughts, diuretics, rubbing of the limb, and exercise.

WEED, n. *wēd* [AS. *weod*, herb, grass: Low Ger. *weden*; Dut. *wieden*, to cleanse, as from noxious herbs]: any noxious or useless plant that is troublesome to the agriculturist, horticulturist, etc.; any person, animal, or thing that is worthless; a slang term for tobacco or a cigar: V. to free from noxious plants; to free from anything hurtful; to root out. **WEED'ING**, imp.: N. the operation of freeing from noxious plants. **WEED'ED**, pp. **WEED'ER**, n. *-ēr*, one who or that which weeds. **WEED'LESS**, a. *-lēś*, free from weeds. **WEED'Y**, a. *-ī*, abounding with weeds; in *slang*, valueless; in *OE.*, consisting of weeds.—The name *Weed* is given to all those plants which grow wild in cultivated grounds, injuring the crops both by choking them and by exhausting the soil. Those weeds which are annuals or biennials, as charlock, yellow rattle, and melilot, may gradually be expelled by merely cultivating, for a succession of years, such plants as are to be cut before the seeds of the weeds are ripe. Perennial weeds, such as couch-grass, can be removed from the ground by only repeated and careful tilling; and, for this purpose, crops which require much hoeing are advantageously planted; and recourse is had to summer fallowing in fields, and frequent weeding in gardens. Thistles and other large weeds are frequently

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pulled in corn-fields before the corn comes into ear, and, to prevent their seeding, they are cut in pastures. Sedges and rushes, which spring up in great abundance in damp grounds, disappear on thorough draining. Leafy crops which thickly cover the soil prevent the growth of many weeds by exclusion of air and light. Weeds which have been rooted up form excellent compost for manure; and those which appear in fallow grounds, serve for green manuring when they are plowed down.

WEED, STEPHEN HINSDALE: soldier: 1834-1863, July 2; b. New York. He graduated at the New York Free Acad. 1851, and at West Point 1854; and was assigned to the artillery. He served on frontier duty in Texas, against the Seminoles 1856-7, in the Kansas troubles 1858, and on the Utah expedition 1860. In 1861 he was promoted capt. and was in command of a battery in the Md. and Va. campaigns; 1862-3 he was chief of the artillery corps at Falmouth, Va.; he took part in the battle of Chancellorsville, and 1863, June 6, was commissioned brig.gen. of vols. for bravery there; from 1863, May 10, he commanded an artillery brigade in the 5th corps. He was mortally wounded at the battle of Gettysburg, while holding the important position of Little Round Top, since called Weed's Hill.

WEED, THURLOW: journalist: 1797, Nov. 15--1882, Nov. 22; b. Cairo, N. Y. At the age of 10 he was cabin-boy on a sloop on the Hudson river; at 12, apprentice in Croswell's printing-office at Catskill; then lived for a short time in a backwoods settlement, but at 14 returned to printing, and was employed in several newspaper offices successively. He was a volunteer in the war of 1812. He settled in New York 1815, and was employed in a printing-office there. In 1819 he established at Norwich, N. Y., the *Agriculturist*, and 1821, at Manlius, N. Y., the *Onondaga Co. Republican*; 1824 he became owner and editor of the *Rochester (N. Y.) Telegraph*. During the anti-masonic excitement, W. was elected to the state legislature 1826-7, where his peculiar and almost unrivalled abilities as a political manager were early recognized. In the mean time he retired from the *Telegraph* and founded the *Anti-Masonic Enquirer*, 1826. In 1830 he settled at Albany and began the publication of the *Evening Journal*, an anti-Jackson, whig, or republican paper, which became the organ of the party, and of the state govt. when its party was in power. Declining all offices for himself, except the profitable one of state printer, he is supposed to have exercised almost supreme influence in nominations and appointments by the whigs, and to have secured the choice of Presidents William H. Harrison and Taylor. He was the friend and adviser of William H. Seward through his whole career. In 1861 he was sent in a semi-diplomatic capacity to Europe, and on his return was presented with the freedom of the city of New York, where he became part proprietor and one of the editors of the *New York Times*, and subsequently editor of the *Commercial Advertiser*.—See his *Autobiography*, ed. by Thurlow Weed Barnes.

WEEDON—WEEK.

WEEDON, *wē'don*, **GEORGE**: soldier: about 1730–90; b. Fredericksburg, Va. At the outbreak of the revolutionary war he was keeping an inn at Fredericksburg, and used his opportunities for disseminating 'sedition,' as is noted in a contemporary Brit. narrative of a tour in America. He was, 1776, Feb., lieut.col. of a Va. regt.; was commissioned brigadier, 1777, Feb. 23, and rendered effective service in the battles of the Brandywine and Germantown. Through pique he resigned his commission soon afterward; but '780 again commanded a brigade, and during the siege of Yorktown was commander of the Va. militia at Gloucester.

WEEK, *n.* *wēk* [*AS.* *wice*, *wicu*; *Icel.* *vika*; *Ger.* *woche*, a week]: the space of seven days; the period beginning with Sunday and ending with Saturday. **WEEK'LY**, *a.* *-li*, pertaining to a week; happening or done once a week; done within a week: **AD.** once a week: **N.** a newspaper or journal published once a week. **WEEK-DAY**, any day of the week except Sunday.

WEEK: a period of seven days. The *W.* was instituted probably as a kind of broad subdivision of the periodical month, corresponding to the four quarters of the moon, or about $7\frac{1}{2}$ days. Though found as a civil institution among some nations at the earliest time—e.g., Hindus, Assyrians, Persians, etc.—it is only with the Jews that we see a religious signification given to the concluding or seventh day of that period itself. Both their cosmogony and legislation are connected with it. The Sabbath (q.v.), the seventh day of the week, was emphatically the day of rest; and seven weeks (i.e., a week of weeks) after the Passover the Pentecost or Feast of Weeks takes place, etc. (see **SEVEN**). It is doubtful whether it was through the Jews that this computation of weeks was introduced to the Egyptians, but it is certain that the latter at an early period counted seven periodical days, naming them according to the seven planets then assumed. The application of the names of the planets to the days of the week, in the order in which they now stand, originated thus: It was an astrological notion that each planet in order presided over an hour of the day; the order, according to their distances from the earth, being (on the old geocentric system) Saturn, Jupiter, Mars, the sun, Venus, Mercury, the moon. Assuming Saturn to preside over the first hour of Saturday, and assigning to each succeeding hour a planet in order, the 22d hour will fall again to Saturn, the 23d to Jupiter, the 24th to Mars, and the first hour of the next day to the sun; in the same way, the first hour of the following day falls to the moon, and so on. From Alexandria, this seven days' week was imported, together with the names of the individual days, to the Greeks—who previously divided their months into three decades—and to the Romans, about the time of Christ. Rome had previously counted her periods by eight days, the eighth day itself being originally called *Nundinæ*—a term later applied to the whole cycle—as returning *nono quoque die*, when the country-people were in the habit of coming to town for purposes of business,

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and chiefly to inquire after public news, the changes in government and legislation, vacant places, etc. But the seven days' cycle soon found great favor among the Romans, owing partly, perhaps, to the spread of Egyptian astrology, though the change was not officially introduced before Constantine. It is certain that the Jewish name Sabbath came into use in Rome; and from Rome it spread to all the Romanic languages, even into the German. It survives in Italian *Sabbato*, Spanish *Sabado*, French *Samedi* (*Sabbati dies*), and German *Sambaztag*, which afterward became *Samstag*. In the same manner, the Latin *Septimana* (Greek *hebdomas*) has become the modern designation for week in the Italian *Settimana*, Spanish *Semana*, French *Semaine*, and even in the Irish *Steachmaine*. The *Codex Theodosianus* is the first document which adopts the term *Septimana* in the meaning of weeks. The Jews, as well as the early Christians, had no special names for the single days, but counted their number from the previous Sabbath (Saturday), beginning with Sunday, as the first after the Sabbath, and ending with Friday, as the sixth after the previous, or eve (*Ereb*) of the next, Sabbath. After a very short time, however, young Christianity, which in the same manner had endeavored to count from the *feria secunda*, or second day after Sunday, to the *Septima* (or Saturday), had to fall back again on the old heathen names, previously introduced in Gaul, Germany, etc., by the heathen Romans. The Sunday, or *dies Solis*, alone was changed in many of the Romanic languages in accordance with the new creed. It was called *Kyriake*, *dies Dominicus* or *Dominica*, the day of the Lord, a term which in Italian became *Domenica*, in Spanish *Domingo*, and *Dimanche* in French: see LORD'S DAY, THE. The Germanic *Frōntac* [from *frōn* = *dominicus*] occurs but once. It is very curious to notice how the names of the five days of the week which followed those named after the sun and moon, became Germanized, as it were, or the names of the originally imported gods translated into those of the Germanic divinities. Thus, the day of Mars became that of Ziu (see TYR). Mercury became Wodan; and the fourth day was called after the latter in Dutch, English, and Scandinavian; while in Germany it was simply called the middle of the week = *Mittwoch*. The day of Jupiter became the day of Thor = Thursday, *Donnerstag*; while the *dies Veneris* was transformed into the day of Freya, wife of Odin (Wodan). The day of Saturnus, retained under this name in some northern tongues, became a *langardage*, or bathing-day, in others; while in Upper Germany it remained a Sunday-eve (*feria ante dominicam*) or *Samstag* (see above). From recent discoveries of Assyriologists, it seems certain that the Assyrians, and through them probably the other Semitic nations, derived their week of seven days from the Accadians or early Turanian inhabitants of Babylonia, who also observed the seventh day as a day of rest. To this remarkable people are to be traced also the planetary names which we still give to the days of the week. The Arabs, like the Jews, count their days (beginning and ending with

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(sunset) by sevens, without giving them planetary names. Greeks, Slavs, and Finns also count their days from Sunday, instead of naming them. The French Revolution altered the seven days' week into a decade of ten days; but this computation, introduced 1793, was abrogated 1805. See CALENDAR. 'The weeks of years,' in Hebrew prophetic poetry (like the Roman *annorum hebdomadæ*), indicate cycles of seven years. In China and the countries which derived their civilization from China, the week is unknown, except in Japan, which 1872 adopted the western calendar and discarded the Chinese.—See Ideler's *Chronologie* (1831); Grimm's *Deutsche Mythologie* (1835); Lenormant's *La Magie chez les Chaldéens* (1874).

WEEKS, FEAST OF [Gr. *Pentecoste* = fiftieth; Heb. *Shabuoth*, also called Feast of Harvest, Day of the First-fruits, etc.]: the second of the three great *Regalim* or Pilgrim Feasts of the Old Testament; was celebrated seven weeks, or 49 days, after the Passover. As the latter was the feast of the barley-harvest, so the former was that of the wheat-harvest. The first two loaves of the new crop were offered up on the day of the festival—leavened, and containing about $3\frac{1}{2}$ quarts each (the Mishnah speaks of their being 7 inches by 3), together with a peace-offering of two lambs. Besides this, a great burnt and sin offering—the former consisting of seven lambs, a bullock, two rams, together with the appropriate meat and drink offerings; the latter of one kid—were added, according to Leviticus (xxiii. 18); while Numbers (xxviii. 27) increases the number of the bullocks to two, and only mentions one ram—a number more in accordance with the regulations for the other festive sacrifices. The Jewish tradition, however, considers the animals mentioned in the later passage as an additional sacrifice; and Josephus has indeed added both up, except as far as the rams are concerned, of which he only gives two. Tradition has given to this feast, which originally was intended to represent only the solemn closing of the harvest, a new significance by making it the anniversary of the Sinaitic legislation, which indeed must have taken place in the first days of the third month. But the Pentecost, which in the Jewish calendar is always on the 6th of Sivan, could not, before the establishment of astronomical computation, fall always on the same day, but must needs have fallen between the 5th and 7th of that month. Moses himself nowhere fixes the date of this festival, as he does with the others. The Karaites, instead of referring the 'morning of [after] the Sabbath' of Lev. (xxiii. 15) to the 16th of Nisan, take it literally, and celebrate the festival always on a Sabbath. The uncertainty of the lunar calculation and observation among the Jews of the Dispersion caused them also to add one day to this festival—a usage still retained. There seems to have been more of the character of a harvest-home inherent in this festival than in the Passover, which partook particularly of the character of a large and solemn family gathering.—For the Christian adoption of this festival, see PENTECOST.

WEEL—WEERT.

WEEL, *wēl*, or **WEELY**, n. *wēl'i* [AS. *welig*, a willow]: in *OE.*, a kind of wicker pot to catch fish in.

WEEM, n. *wēm* [Gael. *uamh*, a cave]: in *Scot.*, a natural cave; sometimes applied to an artificial cave or subterraneous building.

WEEN, v. *wēn* [Goth. *vens*; Icel. *ván*, expectation, hope; Dut. *waan*, supposition; Ger. *wähnen*, to suppose, to think]: to imagine; to think; to fancy. **WEEN'ING**, imp. **WEENED**, pp. *wēnd*.

WEEP, v. *wēp* [AS. *wépan*, to lament, to shed tears—from *wóp*, an outcry; Goth. *vopjan*, to call, to cry; Icel. *apa*, to shout, to cry]: to shed tears; to lament with tears; to express grief or anguish by tears; to spend or waste in tears; in *OE.*, to lament; to complain; to shed moisture. **WEEP'ING**, imp.: **ADJ.** lamenting; shedding tears; dropping; drooping: **N.** act of one who weeps; lamentation. **WEPT**, pt. pp. *wēpt*. **WEEP'ER**, n. *-ér*, one who weeps; a white linen or muslin cuff on a black coat, worn in Great Britain as a sign of mourning. **WEEP'INGLY**, ad. *-lī*. **WEEPING-BIRCH**, a tree of the birch kind with drooping branches. **WEEPING-WILLOW**, a species of willow with long slender branches which droop or hang down: see **WILLOW**.

WEEP'ING-TREES: trees with remarkably elongated and pendulous branchlets, generally mere varieties of species which ordinarily have a different habit; as the Weeping Birch, Weeping Ash, and Weeping Willow, varieties of the Common Birch, Common Ash, and White or Huntingdon Willow. Trees intermediate in their habit between the Weeping Birch and the common variety are very frequent. Weeping-trees are much esteemed for ornamental purposes, as not only beautiful in themselves, but also as a contrast to other trees in lawns and pleasure-grounds. They are therefore carefully propagated in nurseries. The Weeping Ash is often grafted on the Common Ash, but the result is seldom satisfactory, the art of the gardener forcing itself too much upon attention. A tendency to the weeping habit of elongated and pendulous branchlets is manifested in some kinds of trees; as the tendency to vary into a very opposite habit, with the branchlets drawn up close together (var. *stricta* of botanists), appears in others, of which the Swedish Juniper and the Irish Yew are familiar examples.

WEERISH, a. *wēr'ish* [see **WERSH**]: in *OE.*, insipid; weak and washy; crabbed; surly.

WEERT, *wārt*: unwalled town in the Netherlands, prov. of Limburg; 12 m. w.n.w. of Roermond, on the ship-canal from Maastricht to 's Hertogenbosch. There are several good schools, a collegiate institution, town-house, two churches, and three market-places. In the Church of St. Martin is the grave of the Count of Hoorn, beheaded at Brussels 1568, for adhering to the Prince of Orange in the struggle for religious and political freedom. A beautiful promenade leads to the other church, outside the town, north of which are the ruins of the old castle. Besides the

WEET—WEEVER.

markets for farm produce, horses, and pigs, W. has factories for making cloth, stockings, and hats, corn and oil mills. Here was born, 1594, Jan van Weert, who, in boyhood a shoemaker's apprentice, became commander of the Austrian army and vicaroy of Bohemia.—Pop. 7,477.

WEET, *v.* *wēt* [AS. *witan*, to know: Goth. *vitān*, to look]: in *OE.*, to know. WEET'LESS, *a.* *-lēś*, in *OE.*, unknown. WEET'INGLY, *ad.* in *OE.*, wittingly.

WEEVER, *n.* *wē'vēr* [so called from its stinging: F. *givre*, in *her.*, a serpent—from L. *vipēra*, a viper, adder (see VIPER)]: the sting-fish, a small acanthopterous fish of the genus *Trachinus* and family *Uranoscopidae*, called also *Trachinidae*. In this family the ventrals are composed of a spine and five jointed rays, and are generally situated before the pectorals. The scales are cycloid, or absent. The eyeballs are capable of being raised in a remarkable manner out of their sockets, and of being retracted again to the level of the orbits. The species frequent the bottom of the sea. They are often furnished with barbels, and have also a peculiar membranous filament under the tongue, which they can protrude at pleasure. In the genus *Trachinus* the head is compressed, the eyes are placed high and close together. Two species are found on European coasts—the GREATER W. or STING-BULL (*T. draco*), and the LITTLE W. or VIPER W. (*T. vipera*). The former attains a length of nearly 12 in.; the latter, seldom of more than 4 or 5 inches. The general form is long, narrow, and compressed; the Little W. is proportionally deeper in body than the Greater W. In both the gill-cover is furnished with a strong and sharp spine, which is directed backward, and can be appressed to the body, but which is capable also of being made to stand out to present its point to an adversary. Both species are of yellowish-brown color. They inhabit parts of the sea having a sandy bottom, and often partially bury themselves in the sand, but are ready to move off with great celerity if disturbed. They can live long out of the water; and if left by the retiring tide suffer no inconvenience. If assailed, they can, by a sudden bending of the body, make use of one of the strong spines of the gill-cover against the assailant; and the wound thus inflicted is severe. A peculiar stinging sensation attends a wound by a spine of a W., which extends far up the arm if the wound has merely been in a finger, and is much more severe than the pain of a wasp-sting. There is also a groove in the spine, which has perhaps something to do with the conveyance of a poison; though no poison-gland has yet been proved to exist. In France the fishermen are required, under a penalty, to cut off the spines of weevers before selling them.—One species occurs off the coast of Chili.

WEEVIL.

WEEVIL, n. *wē'vl* [AS. *wibba*, *wifel*, a beetle: O. Dut. *wevel*; Ger. *wiebel*, a weevil: allied to the root of Ger. *weben*, to move, float]: an insect of the beetle tribe, exceedingly destructive to grain in granaries, and to growing timber. WEE'VILLED, a. *-vild*, or WEE'VILY, a. *-vl-ī*, infested with weevils.—The name *Weevil* is applied to any of the insects called snout-beetles, of the order *Coleoptera*, formerly included among the *Rhynchophora*, but now placed in the families *Bruchidæ* and *Curculionidæ*. The term W. is improperly applied to a small fly that infests the ear of growing wheat. The true grain-W. is a minute beetle that eats stored grain. Of the weevils proper, family *Bruchidæ*, are those that eat into the seeds of beans and peas. Of the *Curculionidæ*, are the plum-W., called Little Turk, and numerous other species, respectively infesting apples, grapes, strawberry-plants, potato-stalks, various nuts, etc. They are characterized by prolongation of the head into a beak or snout, at whose extremity is the mouth, and from which the club-shaped antennæ spring. Some have straight antennæ; but the greater number have the antennæ *geniculated*, or bent forward at the second joint. The species are very numerous (400 species, described, of 100 genera, in the United States), and are distributed over all parts of the world. They all feed on vegetable food, both in their larval and in their perfect state; and some are notable for the mischief which they do in the larval state to the young shoots, leaves, fruits, and seeds of plants. They are diurnal insects, many very small, others of considerable size. They are slow, timid, and defenseless; and some that infest fruit-trees are easily jarred off into sheets spread on the ground, where they simulate death, and may be gathered up and destroyed; or, early in the morning, may be collected from beneath chips and boards, placed on the ground for their night-shelter under the fruit-trees. Many are of very dull and uniform color; but some are among the most beautiful of the *Coleoptera*—resplendent with finest hues, and brilliant as gems: of such is the well-known Diamond Beetle (q.v.) of S. America. The larvæ of weevils are soft, white, and footless, with very convex rings, hard heads, and horny jaws. The perfect insects are often found on leaves and in flowers of the particular kinds of plants on which they and their larvæ feed. *Rhynchites bctuleti*, a W. often very injurious to vineyards, constructs a nest for its larvæ by rolling up the leaf of the vine, piercing the roll as it proceeds, and depositing eggs between the folds in the inner part of the roll. The larvæ feed on the leaf, which the parents further adapt for their use by cutting the leaf-stalk half through, so that the leaf hangs down; and by the time they are ready to change into the chrysalis state it drops off, or is blown off by the wind, when they bury themselves in the ground to wait for the return of spring. Other trees, e.g., the pear-tree, are infested by weevils which destroy their leaves in a similar manner; the leaves of some, as of the peach, often suffer injury from weevils which devour them, like caterpillars, without rolling them up; and turnips are subject

WEFT—WEHRWOLF.

to the ravages of certain small species of W., which proceed in the same manner. The shoots of fruit-trees, and young grafts, are sometimes destroyed by weevils, which bore into them by means of their beak, and make a small chamber in the centre, in which an egg is deposited, being pushed into its proper place by the beak. The shoot is then cut through a little lower down, and the parent W. may be seen climbing upon it, when the operation is nearly completed, to make it fall by her weight, and returning again to her work if it is not yet ready to fall. She lays about two eggs a day, but continues her operations for many weeks, so that much destruction is effected. The larva feeds on the pith of the fallen shoot, and deserts it when ready to become a chrysalis, to bury itself in the ground.—The larva of a large species of W. (*Calandra palmarum*) inhabits palm-trees in S. America, feeding on their central part, and is eaten and esteemed as a delicacy. When roasted, it almost melts into grease; but its flavor is said to be remarkably fine: this W. is black, about an inch and a half long; its larva is between two and three inches long. Another species (*Calandra sacchari*) is very destructive to the sugar-cane: its larva also is eaten in the W. Indies and Guiana.—The wood of pines and firs is the food of certain kinds of W., so that plantations suffer severely from their ravages. Thousands of acres of pines in the southern states have been destroyed by a W. (*Hylobius pales*) not much more than a quarter of an inch in length; and some of its congeners in other countries are scarcely less destructive, as *Hylobius abietis* in Europe.—There are many species of W. which attack leaf-buds and flower-buds. Thus, *Anthonomus pomorum* infests the apple-tree, depositing its eggs in the flower-buds, and cutting off the prospect of fruit. *Anthonomus pyri* is equally injurious to the buds of pear-trees. Some species of *Rhynchites* lay their eggs in fruits—as apples and plums—at an early stage of their growth, cutting the fruit-stalk that the fruit may fall to the ground. The European Nut-W. (*Balaninus nucum*) lays its eggs in young hazel-nuts, on which the larvæ feed as the nut grows; a nearly allied species attacks, in like manner, the hazel-nuts of America, and another infests acorns. The Pea W. (q.v.) feeds on peas; and other leguminous plants have their peculiar species, which devour their seeds. The Corn W. (q.v.) is very destructive to wheat; and similar species to maize, rice, and other kinds of grain.

WEFT, *n.* *wéft* [from Eng. *weave*: Icel. *veftr*, the woof]: in *weaving*, the threads that cross the warp, running from selvaige to selvaige; a web: see WEAVING: WOOF.

WEHR'GELD, or WEHR'GELT: variants of WEREGILD.

WEHR'WOLF: see WEREWOLF.

WEIGELIA—WEIGH.

WEIGELIA, *wi-jě'lī-a*, or **WEIGE'LA**, *-la*: shrub of nat. order *Caprifoliaceæ* or Honeysuckle family; introduced into England from China and Japan by Robert Fortune 1843, and named after the German botanist Weigel. It has since been found nearly identical with, though more showy than, the plant *Diervilla*, named from a French surgeon, Dierville, who carried it from Canada to the French botanist Tournefort in the early part of the 18th c. *Diervilla* is therefore the botanical name, though under cultivation it is popularly known as Weigelia. In the U. S. there are two species, northern and southern, known as bush honeysuckle, but differing from the true honeysuckles in having more slender calyx lobes, a more regular corolla; and the fruit, which in the honeysuckle is a berry, in W. is a many-seeded two-valved pod. The n. species, *Diervilla irifida*, has petioled leaves, and pale honey-colored flowers, usually three on a stalk, from the axils of the upper leaves. The s. species, *Diervilla sessilifolia*, has sessile leaves and several flowers on a stalk.

WEIGH, v. *wā* [Ger. *wiegen*, to move to and fro; *wägen*, to weigh: Dut. *waggelen*, to waggle: Icel. *vega*, to move, lift, weigh: Dan. *veie*; Sw. *väga*, to weigh: AS. *wegan*, to lift, to weigh: the act of *weighing* taking its name from the *wagging* movement of the beam up and down]: to raise; to lift, as an anchor; to lift or bear up in order to ascertain the weight of (a thing) as compared with a fixed standard; to have weight; to be equivalent to in weight, as, it *weighs* a pound; to sink, as by its own weight; to overburden; to ascertain the heaviness of by actual trial; to ponder in the mind; to be considered as important; to bear or press heavily, as on the mind; to depress; in *OE.*, to consider as worthy of notice; to regard. **WEIGH'ING**, imp.: N. the act of ascertaining the relative weight of a thing; the act of balancing in the mind. **WEIGHED**, pp. *wād*. **WEIGHER**, n. *wā'ēr*, one who or that which weighs; one who examines and tries weights. **WEIGH'ABLE**, a. *-ā-bl*, that may be weighed. **WEIGH'AGE**, n. *-āj*, the cost or rate of weighing. **WEIGHT**, n. *wāt*, the heaviness of a body ascertained in a balance with a fixed standard; a mass, as a standard for weighing; gravity; something heavy; pressure; overwhelming power; importance; consequence; moment: V. to attach weights or add additional weight to. **WEIGHT'Y**, a. *-ī*, heavy; ponderous; momentous; important; efficacious; onerous; adapted to turn the balance in the mind; adapted to convince; in *OE.*, rigorous; severe. **WEIGHT'ILY**, ad. *-lī*. **WEIGHT'INESS**, n. *-nēs*, heaviness; solidity; power of convincing; importance. To **WEIGH ANCHOR**, to lift it from the sea-bottom to permit the ship to sail. To **WEIGH DOWN**, to press or bear down; to oppress with weight. **WEIGH-HOUSE**, or **WEIGHING-HOUSE**, a building for testing the weight of goods. **WEIGH-BRIDGE**, a weighing-machine for weighing loaded carts and wagons.—**SYN.** of 'weight': mass; burden; load; power; influence; efficacy; consequence; pressure; ponderousness; heaviness; impressive-ness.

WEIGHING-MACHINE.

WEIGHING-MACHINE: a contrivance for ascertaining the weight of bodies. *Weighing-machines* are of various forms, according to the quantity and nature of the article whose weight is to be determined. The great majority of weighing-machines are on the principle of the Lever (q.v.), the chief exceptions being the Spring-balance (q.v.), to which might be added (though in such cases the term 'machine' is inapplicable) some of the methods employed to determine specific gravity, time of oscillation, etc. The simplest and primitive

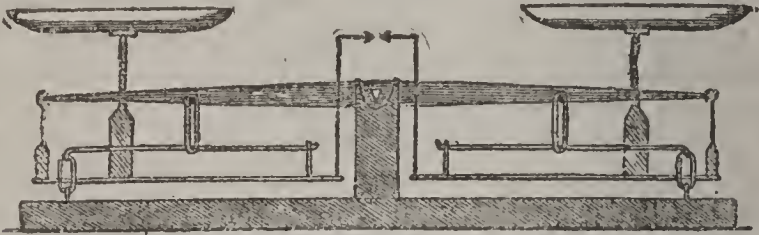


Fig. 1.

form of weighing-machine is the Balance (q.v.) with equal arms, which can be adapted either to the maximum of accurate weighing or to the most rapid equiponderance. But as this machine necessitates the *placing* in one scale of weights equal to the weight of the goods, it was soon found more convenient to employ a lever with unequal arms—the goods to be placed in the scale attached to the short arm, and therefore equipoised by less weights—the ratio of the weights in the two scales being in proportion to the ratio of length of the arms: on this principle the *steelyard* (see BALANCE), the *bent lever balance* (see BALANCE), and the *cart-steelyard* are constructed. But the convenience

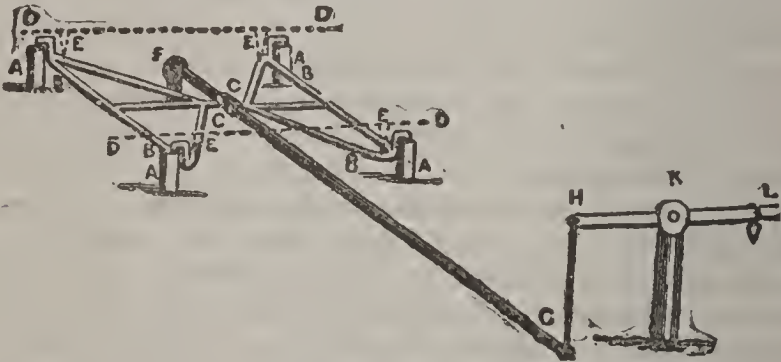


Fig. 2.

of equipoising a greater weight by one much less is counterbalanced by considerable diminution in accuracy—one of the causes of error being the greater liability to flexure of the longer arm of the lever; and another, the necessity, for convenience, of having the arm which is affected by the goods to be weighed made as short as possible—the latter of itself reducing the accuracy of the steelyard to that of a symmetrical balance whose arms are each equal to the short arm of the steelyard. However, on behalf of the steelyard, there is again the advantage of rapid equipoise. Each of these machines is variously constructed, the modifications having reference either to

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convenience of use or to the species or weight of the goods to be weighed: an example of the former is the equal-armed balance (fig. 1), made in an inverted manner, with the scales above, and the rods which connect the scales with the beam so united as to preserve their perpendicularity during oscillation; and the latter is appropriately illustrated by the form of cart-steelyard given in fig. 2. The dotted lines, DD, DD, indicate the grooved plates on which the wheels rest; E, E, E, E, are the four points supporting the wheel-plates on the two triangular levers, CBB, CBB; the triangular levers are supported by the hooked extremities of their bases, B, B, B, B, upon fixed supports, A, A, A, A; while their vertices, C, C, are attached to a lever, FG, whose fulcrum is at F; G is attached by a chain to H, the extremity of a lever of the first kind, whose fixed support is at K, and on whose other arm (graduated) the weights for equipoising the cart and its load are placed. The machine is thus seen to be compound, consisting of the two triangular lever pieces, of a simple lever of the second, and of one of the first kind; the weight L, if sufficient, raising H, and with it G, and thence raising C, and so balancing the downward pressure of the cart and its load at E, E, E, E. Various other forms of the cart-steelyard are in use.

WEIGHTS AND MEASURES.

WEIGHTS AND MEASURES: the systems of units by which the weight, length, breadth, extent, capacity, or volume of bodies is determined. For the proper carrying on of mercantile transactions, and for many other purposes, it is necessary that there be fixed and readily accessible standards of magnitude, of weight, and of value. The lengths implied by the names *a foot*, *a hand*, *a cubit*, *a fathom*, are far too indefinite to have long continued to satisfy the wants of civilized nations; and in every country, by common consent, or by the action of government, determinate measures have been agreed on. These measures, left almost to chance, have been different from one nation to another, even from county to county, sometimes from town to town; and, still more awkwardly, often from one trade or guild to another.

Any one can appreciate the inconvenience of such a want of uniformity, if, in every transaction extending beyond his own sphere, he has to take account of the change of measure, the change of weight, the change of money, perhaps of all three at once. We all see and allow that there ought to be only one system of weights and measures in one country: it is easy to extend our observation, and perceive that, if one system be advisable for one country, a universal cosmopolitan system would be no less advantageous for the whole world.

The only practicable method of establishing a system of measures is to construct standards of reference, and to preserve these carefully in some public place. That these standards may not be worn and injured by too frequent use, it is convenient to have authenticated copies deposited in various towns, so that all dealers and artificers may have ready access to them, and so that all makers of weights and measures may be without excuse for errors in their workmanship.

To set up a standard of measure seems a very simple matter—the authorities have only to fix on the proper length of a yard, to have a piece of wood or of metal made to that length, and to cause it to be properly marked and preserved. For common purposes this seems enough: however, experience soon shows the inadequacy of this simple plan; for by repeated contacts the ends of the yard-measure become worn. Instead, therefore, of making a rod just a yard long, they make it a little longer, and on it form two fine marks a yard distant from each other, and hold this distance to be the true standard. By this expedient the effects of wearing are avoided; copy after copy can be compared with the original, without deterioration of the standard.

But use is not the only cause of deterioration: wood decays or is worm-eaten, and metals are liable to oxidation, so that the material has to be carefully chosen. This is not all: every substance which has been examined is found to change its size with change of temperature; the standard bar is shorter in winter than in summer; and the change, though so small as to be of no moment to the cloth-seller, the carpenter, or the mason, is enough to cause

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great trouble to those engaged in very accurate work. Hence, in selecting the substance for the standard bar, we must have an eye to smallness of expansion as well as to durability. The substances available, in the order of their expansibility, are: *pine or fir, glass, platinum, gold, silver, iron, brass, copper*. Pine may be put aside as lacking durability, and the choice may be said to lie between glass and platinum, neither of which is much acted on by the air, or by the vapors in the atmosphere of large towns. The fragility of glass and the costliness of platinum have been objections; but expense is a trifle when a national standard is concerned. Platinum, then, seems the best substance.

The standard measure for the Brit. empire is a brass rod, into which two pins of gold are inserted; the upper surfaces of these are sunk to the half thickness of the bar, and a small dot is made in the middle of each. The distance between the centres of these dots, taken when the temperature is at 62° F., is declared to be the true yard.

In the same way as the standard of measure, so must the standard of weight be established. A piece of heavy metal is made of the desired weight, and is duly authenticated. The preservation of the standard of weight is difficult. Every occasion on which it is used, each removal of dust from its surface, the actions of the oxygen of the air and of the products of combustion always floating about, produce a sure though slow waste; and all that can be done is to retard this waste as much as possible. Perhaps a lump of platinum would make the best standard; but its softness is a decided objection.

In the use of a standard of weight, another matter has to be taken into consideration. The apparent weight of any substance is less than its true weight by the weight of as much air as is displaced by it. Now, the density of the air is not constant—air, when warmed, expands very much more than any solid body; and therefore a piece of metal appears to weigh more in warm than in cold weather. Moreover, air is rendered more dense by increase of pressure; so, when the barometer is high, all heavy bodies become apparently lighter; when the barometer sinks, they appear to become heavier. Thus the apparent weight of the standard pound is continually changing. If we accurately adjust two weights of brass when the barometer is low and the air warm, and afterward compare them when the barometer is high and the weather cold, we can perceive no change, for, though each has lost weight, they have lost alike. But if we had adjusted a weight of iron to a weight of platinum in light air, and again compared them in dense air, the change would have been at once seen; for, since a pound of iron is more bulky than a pound of platinum, it displaces more air, and its apparent weight undergoes a greater change than does that of the platinum. Fortunately these changes are too small to have perceptible influence on mercantile transactions; yet they are sufficient to create the necessity for an enactment that the standard weight must be held as true when the air is in a specified

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state as to warmth and pressure. Until 1878 the standard brass pound, which served for the British empire, was to be used when Fahrenheit's thermometer was at 62° and the barometer was at 30 inches. But a new act, 1878, while making no material change so far as mercantile matters are concerned, placed the system on another and most unsatisfactory foundation. The standard of length is still the distance between the same two gold pins, but the standard of weight is declared to be a platinum pound avoirdupois to be weighed *in vacuo*. The act contains no instructions as to how this is to be compared with any weight in air, nor does it narrate any connection between the brass weight of 5,760 grains in air with the platinum one of 7,000 grains *in vacuo*. Further, the whole of the old act is repealed, so that there is now no connection between the standards of measure and of weight, nor between these and any natural or recognizable quantity.

The W. and M. used in the Brit. colonies in America were those of the mother country, but in time departed more or less from the Brit. standards; and the W. and M. of the several colonies also varied more or less among themselves. The federal congress, 1817, commissioned John Quincy Adams to investigate the subject, and he had an examination made of the standards used in all the custom-houses: his report (1821) showed that considerable differences existed between the standards of one state and of another, and even between the standards of different custom-houses in the same state. But Adams expressly declined to recommend the adoption of the French metrical system, because of its un-English terms, its disturbance of things as they were, and the inconvenience of the decimal system. Congress (1828, May 19) by law declared the brass troy pound, copied from the official Brit. standard, the standard troy pound of the U. S. mint. A revision of the standards was made by Prof. Hassler 1830, under authority of an act of congress; and accurate copies of the standard of W. and M. were supplied to every custom-house; and (1836) the sec. of the treasury was directed to deposit at the seat of govt. of each state a complete set of copies of all the authorized standards—viz., besides the copy of the standard troy pound, copies of the standard yard, avoirdupois pound (7,000 grains), and gallon (231 cubic in., 58,372.2 grains of distilled water at greatest density). Congress legalized the metric system of W. and M. 1866, as did the Brit. parliament 1864; but in neither country is that system made obligatory; and even the standards of pound, gallon, yard, etc., are not obligatory in the several states except by state legislation.

Time was when a seed of wheat gathered from a well-ripened ear served sufficiently well to define a grain weight; and even now the Eastern jewellers weigh their gems against the *carat* or carob-bean, whose hardness and uniformity seem to justify the selection of it. But for the extended purposes of modern commerce, and particularly for the delicate requirements of scientific research, it is indispensable that we find some unchanging object of compari-

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on; and none can be preferred to the earth itself as the most universally acceptable and as the best defined. For the purposes of geographers and navigators the circumference of the earth is divided into degrees and minutes, the length of one minute being the geographical or nautical mile; and it certainly would have been convenient if the common or statute mile had agreed with this. The dimensions of the earth are now known with a precision far greater than is needed for ordinary purposes—the entire length of the circumference of a meridian circle being 131,236,000 of our standard ft., so that the length of a nautical mile is 6,075 ft. and about 9 inches; and it is highly probably that subsequent and more accurate measurements will not alter this determination more than an inch or two either way. It is usual to divide the minute into 60 seconds, so that a second of the earth's circumference is 101'25; and thus if our standard foot had happened to be one-eightieth part longer than it is, there would have been exactly 100 ft. in a second and 6,000 ft. in a nautical mile. The vexatious disparity of the foot used by different nations appears when we recollect that 100 Vienna ft. make 103'6 English, 100 Amsterdam ft. 92'7 English, 100 Berlin ft. 99'2 English.

The ancient Greeks were fond of dividing into sixties; this division continues in our scales for angles and for time; and it is worthy of remark that if we divide the whole circumference of the earth into 60 parts, each of these into 60, and again each into 60, we arrive at a distance of 607'5 Eng. ft. Now, the length of the ancient Greek stadium or furlong is by some writers stated at 606½ ft., and if deduced from measures of the Roman mile is between 605 and 613 ft.; so that if we desire a cosmopolitan standard we can hardly do better than go back to the ancient Greek *stadium* or the Chinese *li*, slightly corrected to suit the more accurate determination of modern times: this would bring us to the geographical foot, one-hundredth part of a second of the earth's meridian.

The standard of weight is readily connected with the standard of measure. Some substance which can be easily obtained pure is chosen, and a definite bulk of it is weighed. Distilled water is universally selected for this purpose; and in the British system the weight of one cubic inch of pure water is declared to be 252'458 grains when it is at the temperature of 62° F.

It has long been known that water does not continue to contract as it is cooled; the contraction becomes less and less as the temperature approaches to 41° or 39° F.; and the water, when cooled more, begins to expand, and continues to grow more bulky until it comes to the point of freezing. On this account it has been proposed—and without any doubt it would be the best plan—to take water when at its greatest density as the standard for comparison, because then an error of a degree in temperature will produce no perceptible error in the weight.

The operation of verifying the standard of measure by comparing it with the size of the earth is necessarily expen-

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sive and complicated to be attempted only under the auspices of a wealthy government, or with concurrence of several nations; and it is desirable to find something more local and more easily obtained wherewith to compare our measures. The length of the Pendulum (q.v.) has been proposed; and, on account of a very simple and beautiful property of pendulums, the comparison can be readily made. If we imagine an excessively minute heavy body to be suspended by a thread so fine that the weight of the thread may be neglected, the compound so formed is called a simple pendulum; and the question becomes, what must be the length of such a pendulum in order that it may vibrate from side to side in, say, one second of time. Now, it is clear that we cannot obtain this length by direct experiment, since we cannot construct such a pendulum. Biot tried to approximate to it by using a small ball of platinum hung by a very fine wire. However, it is known that if a heavy rigid mass, AB, be suspended by a knife-edge C, and if its vibrations be made in the same time with those of a simple pendulum of which the length is CD, then if we place another knife-edge at D, and reverse the ends A, B, the compound pendulum will again vibrate in the same time as before. Hence we have a very simple method of comparison. Having constructed a strong bar



with two knife-edges at a known distance from each other, say at the distance of a yard, let us then by many trials, filings, and scrapings so adjust it that the times of vibration shall be alike for the two knife-edges; and, finally, let us count how many vibrations such a pendulum makes per day, and then we shall have a means of verifying our measure.

The act of parliament which fixes the present Brit. weights and measures, enacts that the length of a pendulum vibrating in one second of mean solar time is 39·13929 inches: now, the lengths of pendulums are proportional, not to the times in which they vibrate, but to the squares of those times; and so, if we know the length of one pendulum, and the number of vibrations it makes per day, we can calculate what ought to be the length of another to vibrate a given number of times. A convertible pendulum having the distance between its knife-edges exactly 36 inches ought to make 90088·42 vibrations per day.

When only a degree of accuracy sufficient for commercial and ordinary purposes is aimed at, the above process is not difficult; but when extreme precision is wanted, the operation is attended with many very great difficulties: it involves considerations which would hardly have been expected. In the first place, our experiments are made in air, and the buoyancy of the air lessens the actual weight of the pendulum; that buoyancy has to be allowed for, and therefore it is declared that the above length is that of a pendulum vibrating in a vacuum. Next, since the earth has a diurnal motion on its axis, every substance placed

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On it has a centrifugal tendency which goes to modify what otherwise would have been its gravitation; this centrifugal tendency produces the earth's oblateness, and causes a variation in the intensity of gravitation from one latitude to another. A stone is actually heavier in Albany than it is in Baltimore. This change in gravitation cannot be measured by a balance, because the weights at each end of the balance are changed alike; but it is seen at once in the going of a clock; for a pendulum regulated to go truly in New York is found to go too fast when taken to a higher latitude, and to lose time when carried nearer to the equator—hence the British enactment that the pendulum must be swung in the latitude of London. Again, the attraction which the earth exerts on bodies placed near it diminishes with their distances, being inversely as the squares of the distances; hence a clock carried from the bottom to the top of a hill loses time perceptibly; so it is necessary to have the additional enactment that the pendulum be swung at the level of the sea.

In addition to these niceties, there are others connected with the manipulation, such as the parallelism of the knife-edges, their bluntness, the extent of the area of oscillation, and the stability of the supports, so that altogether the exact measurement of the length of the seconds pendulum is a matter of very great complexity. Notwithstanding, the systems of weights and measures of all civilized nations suffice for all ordinary purposes, whether those systems be regarded as derived from the dimensions of the earth or from the intensity of gravitation.

No system of measures from which geographical dimensions are excluded can ever claim to be of universal application. It is essential that the unit of measure bear some simple relation to the earth's circumference; for otherwise the operations of the surveyor will not accord with those of the geographer. The only question, therefore, in regard to the establishment of a cosmopolitan system, is as to the number of parts into which the earth's circumference is to be divided. Now, the denary system of numeration has already asserted its supremacy; one by one the schemes followed by different nations have given way to it, and their very languages have been modified by its influence; sufficient traces remain to show how extensive these modifications must have been. The *three-score and ten* is not yet forgotten in English, nor the *quatre-vingt dix neuf* in French. In many trades the counting is still in dozens and grosses; yet merchants count their interest, their discount, and their dividends in cents. The surveyor divides the foot on his levelling-staff into tenths, hundredths, and thousandths; he makes his Gunter-chain of 100 links. The astronomer no longer divides the second into 60 thirds, but into hundredths; he gives his equinoctial time in decimal fractions of the day, and he makes the arguments for the planetary disturbances in thousandth parts of the whole revolution. There is no single instance in which the decimal system, once adopted, has been abandoned. See DECIMAL SYSTEM.

WEIMAR—WEIR.

WEIMAR, *vī'mār*: town of Germany, cap. of the grand duchy of Saxe-Weimar-Eisenach, and residence of the grand duke; 50 m. s.w. of Leipzig by railway, 136 m. s.w. of Berlin. It is in a pleasant valley on the left bank of the Ilm; but the environs are not remarkable, and the town itself is irregularly and plainly built. Though the residence of the court, and finding its subsistence in providing for the wants of distinguished visitors, W. has neither trade nor manufactures. This dull, provincial-looking town received a literary lustre by the residence here, at the close of the 18th and the earlier portion of the 19th c., of Goethe (q.v.), Schiller (q.v.), Herder (q.v.), and Wieland (q.v.), at the court of Karl-August (see SAXE-WEIMAR-EISENACH); and the monuments, traditions, and associations of that group give W. all its present interest. The town church (*Stadtkirche*), dating from 1400, has an altar-piece by Cranach, and contains memorable tombs, among which are those of the brilliant soldier Bernhard of Weimar (q.v.) and of Herder, philosopher and critic. The ducal palace is a handsome building, some of whose apartments are decorated by frescoes illustrating the works of Goethe, Schiller, Herder, and Wieland. The public library contains busts of these men of genius; and a number of relics, as the gown worn by Luther when a monk; and Gustavus Adolphus's leather belt pierced by the bullet that caused his death at Lützen. The houses of Goethe, Schiller, and Herder are still pointed out. The two former of these poets lie interred in the grand-ducal burial-vault. The park and gardens of the palace, within which is shown the summer residence of Goethe, are a pleasant promenade. Pop. (1885) 21,565; (1890) 24,546; (1900) 28,489.

WEIR, *wēr*, **JOHN FERGUSON**: artist painter: b. West Point, N. Y., 1841, Aug. 28; son of Robert Walter W. (q.v.). Having studied his art under his father, he opened a studio in New York 1861; was elected associate of the Nat. Acad. 1864, and academician 1866; became director of the School of Fine Arts at Yale 1869; was a judge in the fine arts dept. of the Philadelphia Centennial Exhibition 1876. Of his paintings the best known are: *The Gun-foundry*, exhibited in the Nat. Acad. 1867, at Paris the same year, at Philadelphia 1876; *Forging of the Shaft* (1868), reproduced and exhibited at Paris 1878, after the original had been destroyed by fire; *Sunset at West Point*; *Tapping the Furnace*; *The Confessional*.—His brother **JULIAN ALDEN W.** (b. 1852, Aug. 30) had for masters his father and the French painter Gérôme. He has gained distinction as a portraitist and *genre* painter.

WEIR, **ROBERT WALTER**: artist painter: 1803, June 13—1889, May 1; b. New Rochelle, N. Y. At the age of 19 he began the study of painting under John Wesley Jarvis; went to Florence, Italy, 1824, and there executed his *Christ and Nicodemus*, and *Angel Visiting Peter*. He spent the year 1825-6 in Rome. W. became prof. of drawing at West Point 1832, and held the professorship 42 years. He executed a great many historical paintings of distinguished merit. Among his best-known works are (besides the two

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named above): *Belle of the Carnival* (1836); *Bourbon's Last March*, and *Landing of Henry Hudson* (1842); *Indian Captive*, and *Taking the Veil*, and a *Church* (1847); *Embarkation of the Pilgrims* (1845); *Evening of the Crucifixion*, (1867); *Christ in the Garden* (1873); *Columbus before the Council of Salamanca* (1884).

WEIR, or **WEAR**, *wēr*; called also a **DAM**: a structure across a stream, for the purpose of diverting the water into a mill-lade, or of raising its level to increase its depth for navigation, or of providing the means of catching fish. There is also the waste-weir, for the purpose of preventing a reservoir embankment being overtopped by floods; and the gauge-weir, for the purpose of computing the quantity of water flowing over it, from a measurement of the dif-

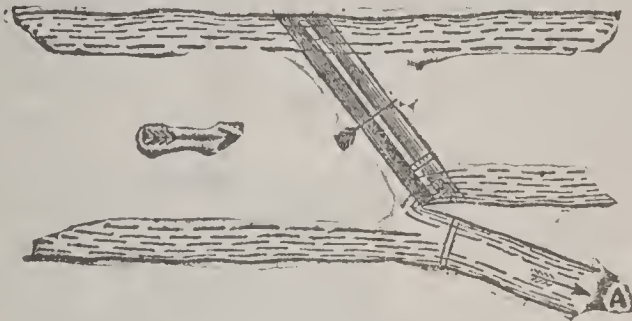


Fig. 1.
A, intake.

ference of level between the crest of the weir and the surface of the still water above it. The word is used sometimes, though perhaps not quite correctly, to denote a training-wall or other structure parallel with the general line of a river, for remedying or preventing loops or sinuities. A weir may—according to its purpose or mate-

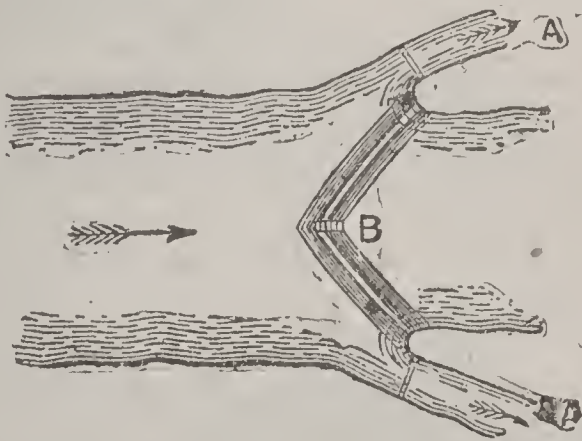


Fig. 2.
A, A, intakes; B, fish-pass.

rials—be formed of stone, timber, or brushwood, or a combination of any two. It is generally placed obliquely across the stream, to make the length of its crest considerably greater than the width of the channel (fig. 1), and thereby prevent the water in floods from rising to so great a height as with a shorter crest, to the risk of damaging the adjoining low lands, and probably putting the mills above in backwater. In such cases, the mill intake, or

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the navigation lock, as the case may be, is placed usually at the down-stream end of the weir. Much obliquity, however, makes the current to impinge against and to cut into the side of the river opposite the lower face of the weir; and to prevent that effect, weirs are sometimes made of the shape of two sides of a triangle, or rather of that of a hyperbola, with its apex pointing up stream, which arrangement is peculiarly applicable to the case of there being an intake for a mill on each side of the river (fig. 2); and the apex is a very suitable place for a fish-pass or ladder. Not unfrequently, when at a wide part of the river, the weir is placed at right angles across, and with a slight curve upward (fig. 3); and a natural shelf of rock

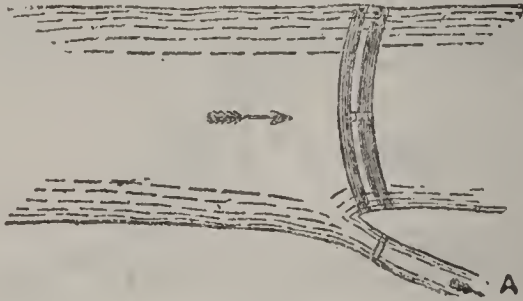


Fig. 3.
A, intake.

is then very advantageously used in either a mill or fishing weir, the low parts being built up where necessary with stone or timber.

The down-stream face of a weir is generally a nearly flat slope of stone 'pitched' or set on edge, and with its toe or lower edge either sunk into rock or protected from being underwashed by a row of timber-sheeting piles, and frequently also by an apron of timber-planking. This slope is either straight or made with a hollow curve (fig. 4), so as to check the tendency of the water to acquire increasing velocity as it descends; and it is frequently divided into panels by timber framing, so as, in the event of a portion of the pitching being washed out, to lessen the risk of the whole of it being carried away. The up-stream face is generally a slope dipping into the water, and protected by stone

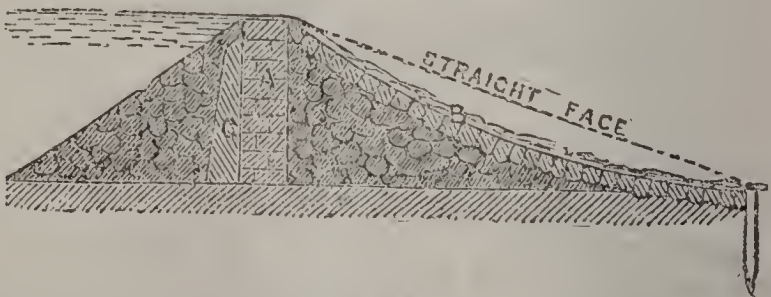


Fig. 4.
A, masonry, B, pitching; C, clay puddle.

pitching; but it is sometimes a perpendicular wall. To render an ordinary sloping weir water-tight, sometimes there is under the crest or coping a row of well-jointed and close-driven timber-sheeting piles; but those being liable to

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decay, without their decay being visible, a better, though a more difficult and expensive arrangement, is to build a perpendicular wall of water-tight masonry under the crest. In either case, generally there is the additional precaution taken of having a wall of pounded clay on the up-stream side of the wooden or stone barrier; and sometimes a mere wall of pounded clay alone, in the centre of the weir, is trusted to, as the sole means of making it water-tight; but the latter is not a satisfactory arrangement, unless the stonework next to the clay be so closely compacted by an admixture of gravel and sand as to prevent any current of water from reaching the clay and cutting into it. The down-stream face is sometimes made a nearly perpendicular wall, which, unless for the obstacle which it presents to the ascent of the salmon, is a good arrangement where the bottom of the channel is solid rock, so as not to be liable to be scooped out by the falling water; else it must have at its foot a level apron of heavy masonry for the water to fall on

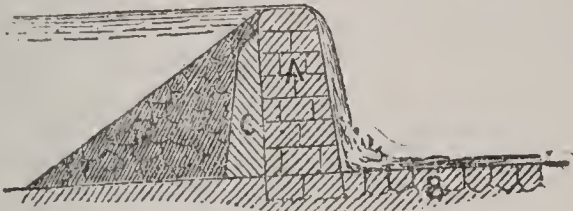


Fig. 5.

A, masonry; B, pitching; C, clay puddle.

(fig. 5). The down-stream face is sometimes made of a series of steps, so forming a succession of levels and light falls (fig. 6), which is a good plan for breaking the force of

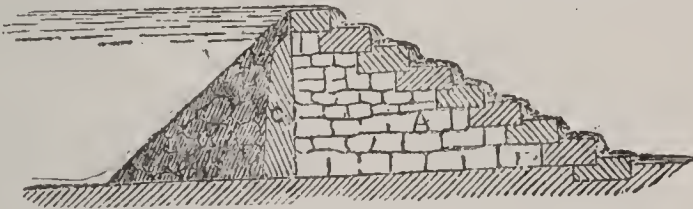


Fig. 6.

A, masonry; B, pitching; C, clay puddle.

the falling water; but it, like the perpendicular face, presents obstacles to the ascent of the salmon, unless a fish-pass or ladder be provided.

The weir for the purpose of navigation need not differ from the mill-weir, otherwise than that, instead of an intake sluice, there must be a Lock (q.v.) with upper and lower gates, and a chamber between them as long and as wide as the largest vessels navigating the river. Fishing-weirs are generally provided with a sort of cage or cruive, consisting of a chamber (fig. 7), usually four or five ft. in width, and as much or a little more in length, having at the upper end a portcullis grating, called the heck, with the bars vertical and three inches apart, so as to let small fish pass through, and at the lower end two folding horizontally sparred doors called the inscales, pointing upward, but set so as to leave a small opening between the points,

through which the ascending salmon enter. Partly from the inward pointing of the incales, and partly from the instinct of the fish to ascend the river, they seldom get out again, and are easily caught. Frequently weirs serve the purpose both of mill-dams and of fishing-weirs.

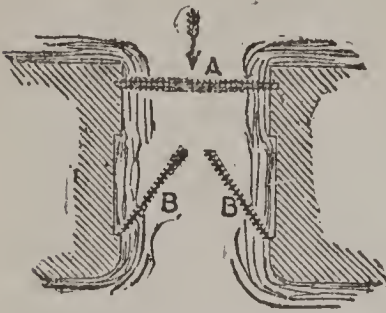


Fig. 7.

A, heck; B, B, incales.

A weir sometimes used for catching salmon and other fish in tidal rivers consists of a sort of horseshoe shaped structure of loose stone-work through which the water can percolate freely, with its heel or open end pointing up-stream. The fish ascend the river with the flood-tide, and, falling back with the ebb, part get embayed within the walls at low water, and are either left dry or are shut in so as to be easily caught.

Weirs, either of stone or of wicker work, are also sometimes used as accessory to what in English fishing-rivers are called putts and putchers, being a sort of combination of wooden gratings acting something like those of the cruive and network; and, in many cases, weirs, either natural, as formed by rocks or islands, or strictly artificial, are used for catching fish by means of an attached poke-net extended by the current.

WEIRD, a. *wērd* [AS. *wyrd*, fate, destiny; Goth. *vair-than*; AS. *weorthan*; Ger. *werden*, to come to pass, to become]: connected with or able to influence fate or destiny, as the *weird* sisters; of or pertaining to the world of witehes; supernatural; unearthly; wild and dreary: N. in *OE.* and *Scot.*, fate; destiny; a spell. WEIRD'NESS, n. *-nēs*, the state of being weird; unearthliness.

WEIS'HAUPT, ADAM: see ILLUMINATI.

WEISMANN, *vīs'mân*, AUGUST: zoologist: b. Frankfurt-on-Main, 1834, Jan. 17. He studied medicine successively at Göttingen, Vienna, and Paris, giving attention also to the natural sciences. He became physician to Archduke Stephen of Austria 1861; went to the Univ. of Giessen 1863, to study zoology under Leukart; became, 1866, extraordinarius, and, 1873, ordinarius prof. at Freiburg in Breisgau. He has subjected the Darwinian theory to most searching criticism, and appears to have invalidated some of its leading principles, postulates, and arguments. He has pub. *Die Entwicklung der Dipteren* (1864); *Studien der Descendenztheorie*, 2 vols. (1875-6); *Die Entstehung der Sexualzellen bei den Hydromelusen*, 2 vols. (1883); and several essays on *The Duration of Life*, *Heredity*, etc.

WEISS—WEKA.

WEISS, *wiss*, **JOHN**: philosopher: 1818, June 28—1879, Mar. 9; b. Boston; son of a German Jew. He graduated at Harvard 1837, and studied in the Harvard Divinity School 1843, having in the mean time attended lectures in European universities. He was for a short time pastor of a Unitarian chh. in Watertown, Mass., but resigned his charge on account of his anti-slavery principles; then was Unitarian pastor in New Bedford, Mass., and again resigned, now on account of ill-health. After several years of travel and study he went back to the Watertown chh. 1859, and held the pastorate till 1870. In religion he was a rationalist, in philosophy a transcendentalist, in politics and social economy a radical reformer. He went frequently on lecturing tours, his principal themes being *Greek Religious Ideas*, *Humor in Shakespeare*, *Shakespeare's Women*; was author of many reviews, sermons, and magazine articles. He pub. *Life and Correspondence of Theodore Parker*, 2 vols. (1864); *American Religion* (1871); translated and edited *Philosophical and Æsthetic Letters and Essays of Schiller* (1845).

WEISSENFELS, *vīs'sēn-fēls*: town of Prussia, prov. of Saxony; on the Saale; 19 m. s.w. of Leipzig. The people are employed in the porcelain factory and in wool-spinning, shoemaking, manufacture of pianofortes, tanning, and a trade in timber. The castle, former residence of the dukes of W., is now a barrack.—Pop. (1885) 21,766; (1890) 23,868.

WEISSENFELS, *vīs'sēn-fēls*, **FREDERICK H.**, **Baron DE**: soldier: 1738—1806, May 14; b. Prussia. After serving in the British army for a time, he came to this country and settled in Dutchess co., N. Y., 1763. In 1776 he was made lieut.col. of the 3d N. Y. battalion. He was at the battles of White Plains and Trenton, at the surrender of Burgoyne, and engaged in the battle of Monmouth, commanding the 2d N. Y. battalion. He died in New Orleans.

WEITZEL, *wīt'sēl*, **GODFREY**: 1835, Nov. 1—1884, Mar. 19; b. Cincinnati: milit. engineer. He graduated at the U. S. Milit. Acad. and entered the army as brevet 2d lieut. of engineers 1855; was promoted 1st lieut. 1860, capt. 1863, maj. 1866, and lieut.col. 1882; commissioned brig.gen. 1862; brevetted and promoted maj.gen. 1864; and brevetted maj. U. S. A. 1862, lieut.col. 1863, and brig.-gen. and maj.gen. 1865. He aided in constructing fortifications at New Orleans 1855-59; was asst. prof. of engineering at West Point 1859-60; chief engineer in Gen. Butler's expedition to New Orleans, and planned the capture of the city; held important commands in operations in La.; was chief engineer of the Army of the James, and constructed the defenses of Bermuda Hundred, James river, and Deep Bottom 1864; was second in command in the first Fort Fisher expedition; and took possession of Richmond after the surrender. After the war he was in charge of important govt. engineering work.

WE'KA, or **WEE'KA**: see **OCYDROME**.

WELCH.

WELCH, WILLIAM HENRY: pathologist: 1850, Apr. 8—
—————; b. Norfolk, Conn. He graduated at Yale Univ. 1870, and at the College of Physicians and Surgeons, New York, 1875; afterward studied pathology at several European universities. He is (1897) prof. of pathology and demonstrator of anatomy in Johns Hopkins Univ., and pathologist in the univ. hospital. In 1888 he delivered the Cartwright lectures on the *General Pathology of Fever*. He has contributed many articles to standard works, and furnished the chapters on pathology and pathological anatomy in late editions of Flint's *Theory and Practice of Medicine*; the chapters on *Organic Diseases of the Stomach* in Pepper's *System of Medicine*, and on *General Considerations Concerning the Biology of Bacteria, Infection and Immunity*, in Pepper's *Text-book of the Theory and Practice of Medicine*. His contributions to pathological and anatomical literature have attracted wide attention, and are valued for their clearness and deep research.

WELCHER—WELD.

WELCHER, or **WELSHER**, n. *wěł'shēr*: in *slang*, a betting man who absconds if he loses his bets.

WELCKER, *věł'kēr*, **FRIEDRICH GOTTLIEB**: German philologist and archæologist: 1784–1868; b. Grünberg, in Hessen-Darmstadt. He studied at Giessen. On his return from a stay of two years in Rome, he was appointed prof. of anc. lit., first in Giessen, then in Göttingen, finally (1819) in the Univ. of Bonn. W. was one of those scholars who deal not only with the history and philosophy of language, but also with the sympathetic understanding and the imaginative reconstruction of the life and thought and art of famous ancient peoples, as these are connected with their languages. We note here his three most important works of a larger compass. The first is the *Æschylean Trilogy* (1824), in which the organic connection and sequence of the Greek dramas are set forth with a richness of constructive detail not altogether free from the fanciful and problematic element. The second is the *Epic Cycle* (1835–49), a work which has done great service to the right appreciation of early Greek literature. The third, perhaps his greatest work, is the *Götterlehre*, or Greek Mythology (1857–62), which, in selection from the wide German literature of this subject, applies delicate tact and just discrimination.

WELCOME, a. *wěł'kŭm* [*well*, and *come*: AS. *wel*, well, and *cuma*, a comer]: admitted willingly; gladly received, as a *welcome* visitor; producing gladness in its reception; free to have or enjoy; grateful; pleasing: N. kind reception or salutation: V. to salute or receive with kindness or gladness; to receive and entertain hospitably and cheerfully. **WEL'COMING**, imp. **WEL'COMED**, pp. *-kŭmd*. **WEL'COMELY**, ad. **WEL'COMER**, n. *-ēr*, one who welcomes or receives. **WEL'COMENESS**, n. *-nēs*, the state of being welcome. pleasing, or grateful. **TO BID WELCOME**, to receive with professions of kindness or hospitality.

WELD, v. *wěld* [Sw. *wälla*; Ger. *wellen*, to join two pieces of iron at a heat just short of melting—a particular usage of *well*, to boil or spring up (see **WELL** 2)]: to hammer together into one body when heated almost to melting, as two pieces of iron: N. a joining together, as of two pieces of metal. **WELD'ABLE**, a. *-ă-bl*, that can be welded. **WELD'ING**, imp.: N. the process of uniting firmly together by means of hammering or pressure two or more pieces of iron when heated to whiteness. **WELD'ED**, pp. **WELDING-HEAT**, a white heat to allow the welding process.

WELD, v. *wěld*: OE. for **WIELD**.

WELD, n. *wěld* [Ger. *wau*; F. *gaude*; Sp. *gualda*]: plant used by dyers to give cloth a yellow color; *Reseda luteola*, of the family *Resedacæ*; called also *wold*, *woold*, *yellow-weed*, *dyers'-weed*, and *dyers'-rocket*.—*Weld*, which belongs to the same genus as *Mignonette* (q.v.), is a native of waste places in many parts of Europe, but is becoming naturalized in N. Y. and elsewhere in the United States. It has an upright stem, 2–3 ft. high; lanceolate, undivided

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leaves; and long racemes of small yellow flowers, with 4-partite calyx and prominent stamens. It is used for dyeing, and for this purpose it needs careful cultivation. The best is grown in France, England, and Holland; especially about Cette, in France. Good W. must have flowers of beautiful yellow or greenish color, and abound in leaves; that which is small, thin-stemmed, and yellow is better than that which is large, thick-stemmed, and green; that which grows on dry sandy soils is better than that produced on rich and moist soils. It is cultivated less than formerly, but is still a valuable dye-stuff, serving equally for linen, woolen, and silk—dyeing not only a rich yellow, but, with proper management, all shades of yellow, and producing a bright and beautiful color. Stuffs previously dyed blue are by means of W. changed to a pleasing green.

WELD, ANGELINA EMILY (GRIMKE): see GRIMKE, ANGELINA EMILY.

WELD, *wëld*, THEODORE DWIGHT: social reformer: b. Hampton, Conn., 1803, Nov. 23. He was educated at Phillips Acad., Andover; became, 1830, general agent of a society for promoting manual-labor instruction; began to study divinity at Lane Theol. Sem. (Presb.), Cincinnati, O., 1833, but, when a students' anti-slavery society was suppressed by the trustees of the institution, left the school. He then went on the public lecturing platform to agitate against slavery; and when, 1836, he lost his voice, was appointed editor of the publications of the Amer. Anti-slavery Soc. He opened at Eagleswood, N. J., 1854, a school in which pupils were received without discrimination of color; removing to Hyde Park, Mass., he engaged in teaching and public lecturing. He pub. many anti-slavery books and pamphlets. He d. 1895, Feb. 3.

WELD'ING: process by which some substances are united together in a softened state. It is generally applied to such metals as malleable iron, two pieces of which, heated to redness, may be made to unite by applying them together and beating with a hammer. Other substances, such as horn and tortoise-shell, can be welded by first making separate pieces soft by heat, and pressing them together, which causes so intimate a union that no traces of the junction remain after cooling.

Electric Welding is an application of voltaic electricity to the welding and union of metals. The first suggestion of electric welding was by Joule, of Manchester, England, in a paper published 1856. Successful experiments led to the suggestion by Joule that the use of a magneto-electric machine would best serve for producing the needed electric current. Efficient machines for iron, steel, and other welding, the invention of Prof. Elihu Thomson, of Lynn, Mass., were exhibited to the Brit. Assoc. in Bath, England, 1888, and at the Paris Exposition 1889: by these machines, iron welding is accomplished twice as rapidly as by the most expert craftsmen, and with a strength in the weld equal to 92 per cent. of the strength of the solid metal. A

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second system of electric welding, elaborated in Russia by Dr. Nicolas von Bernados, of St. Petersburg, and already extensively used—especially for thin iron and steel sheets, hoops, etc.—secures the required heat at the surface to be welded by connecting the metal with the negative pole of the dynamo-machine, and applying a carbon electrode to the parts to be heated, thus completing the circuit, while the reducing power of the carbon preserves the heated metal surfaces from oxidation. The Thomson system depends on pure incandescence or heating by a current passing through a conductor of comparatively high resistance, which conductor is the material to be welded; the Bernados system utilizes the voltaic arc and localizes its heat by making the parts to be welded an electrode of the arc. The former has acquired considerable importance, and its applications are increasing every day; it is impossible to enumerate them in full.

Prof. Thomson's system is based on the use of the alternating current. This type of current can be produced by dynamos, so as to be of high intensity and tension. It is passed through a long coil of wire, which represents the primary of an induction-coil. As secondary a large bar of metal is used, of few convolutions, or sometimes only of one, whose ends are connected to clamps. When the clamps are connected by a large bar of metal, the secondary circuit is closed and appears as one of almost zero resistance. The current induced in it from the primary is one of very low electromotive force because of its lack of convolutions, and of enormously high intensity from its low resistance. In welding, the two pieces to be united are secured in the clamps, the current is turned on, and the ends of the pieces are pressed together. The point of contact is of high resistance. It at once becomes hot, and in a few seconds reaches a white heat. The two pieces are pressed together constantly, and if necessary a little flux (borax, etc.) is added, and a perfect welding action takes place. This process is extensively used also for brazing.

A white heat is needed for welding iron and steel; for other metals a lower heat suffices. The process is applicable to almost all metals and alloys—lead, copper, brass, and others. It has developed the interesting scientific point that probably under proper conditions all metals are weldable. By it also different metals can be welded together. For a $\frac{1}{2}$ -inch copper or 1-inch iron bar a current of 20,000 ampères is required.

The application of electric welding to the making of projectiles gives a stronger and better shell, at greatly reduced cost. The method is that of uniting three separately made parts—a head, a base, and a central part cut from a length of solid drawn steel piping. The metal seems to be made extra-strong at the point of welding. It is possible to join iron to high carbon steel, also to weld wrought-iron or steel to steel castings, or even to cast-iron. A cheaply made shell using common iron or low carbon steel tubing, and stamped or cast heads and bases, may have all the advantages of wrought-iron and none of the disadvan

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tages of cast metal. A wrought-steel projectile can now be made at less cost than a cast-iron one, and for armor-piercing shell, or even molded steel shell, there can be no comparison, as to cost of production. The process also solves a problem which has baffled inventive skill hitherto—that of welding the solid heads on to the large brass cartridge-cases now used with the projectiles of rapid-fire guns—guns which, having a non-recoil and pivoted mount, are aimed and fired from the shoulder, and which range in size up to as large as the 6-inch gun.

WELFARE, *n.* *wēlfār* [AS. *wel*, well, and *faran*, to go]: state of doing well; prosperity; well-being; happiness.

WELK, *v.* *wēlk* [Ger. and Dut. *welken*, to fade, to decay—from *welk*, faded]: in *OE.*, to fade; to decay; to wither; to shorten; to fall. **WELK'ING**, *imp.* **WELKED**, *pp.* *wēlkt*.

WELKED: same as **WHELKED**: see **WHELK** 2.

WELKIN, *n.* *wēl'kin* [AS. *wolcen*; Ger. *wolke*, a cloud]: the vault of heaven; the sky: **ADJ.** in *OE.*, applied to a sky-colored eye.

WELL, *a.* *wēl* [Goth. *vaila*, better: Dut. *wel*; Icel. and Dan. *vel*; OHG. *wela*; Ger. *wohl*, well: W. *gwoell*, better (see **WEAL**)]: in a state of health; fortunate; advantageous; satisfactory; recovered from a sickness; correct; proper; in *OE.*, happy: **AD.** in a choice or desirable manner; justly; happily; fortunately; rightly; advantageously; skilfully; conveniently; considerably; very much; to a sufficient degree; perfectly; a word expressing satisfaction, or merely expletive, as, '*well, well*, be it so,' '*well*, let us go.' **AS WELL AS**, together with; besides: in addition to. **WELL-APPOINTED**, *a.* fully furnished and equipped. **WELL-BEHAVED**, *a.* seemly and prudent in conduct. **WELL-BEING**, *n.* happiness; prosperity. **WELL-BORN**, of good or respectable birth. **WELL-BRED**, educated in polished manners; cultivated; refined. **WELLDOER**, one who does well. **WELLDOING**, *n.* performance of duties in a proper manner: **ADJ.** accomplishing one's duties properly. **WELL-DONE**, an exclamation expressive of praise or approbation. **WELL-ENOUGH**, good in a moderate degree. **WELL-FAVORED**, handsome; beautiful; pleasing to the eye. **WELL-INFORMED**, furnished with much correct information; intelligent. **WELL-INTENTIONED**, having upright or honorable purposes. **WELL-KNOWN**, fully known; notorious. **WELL-MANNERED**, polite; civil; mannerly. **WELL-MEANING**, having good intentions. **WELL-MEANT**, rightly intended; kind. **WELLMET**, term of salutation expressive of great satisfaction. **WELL-NIGH**, almost; nearly. **WELL-OFF**, thriving; prosperous. **WELL-TO-DO**, easy in circumstances; prosperous. **WELL-READ**, extensively informed from books. **WELL-SPENT**, passed in virtue; spent in a profitable way. **WELL-SPOKEN**, uttered with propriety and fitness. **WELL-WISHER**, one inclined to act to another as a friend. **WELL-TIMED**, done or said at the proper time. **WELL-WORN**, much worn,

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WELL, *n.* *wēl* [AS. *weallan*; Icel. *vella*; Ger. *wallen*, to boil, to bubble up; AS. *wylle*; Dut. *wel*, a spring; Ger. *welle*, a wave or surge]: a fountain or natural supply of water; a spring or source; a deep narrow pit dug in the earth for the purpose of retaining spring or other water (see **WATER-SUPPLY**: **TUBE-WELL**): an inclosure around the bottom of a ship's pumps; an inclosed space in a fishing-boat for keeping fish alive; a deep excavation for military purposes; in *arch.*, the space in which winding stairs are placed; any similar space, as between buildings, for admission of light and air: *V.* to pour forth, as from a spring; to issue forth, as water. **WELL'ING**, *imp.* **WELLED**, *pp.* *wēld*. **WELL-DRAIN**, *n.* a deep pit to drain wet land: *V.* to drain wet land by means of pits or wells. **WELL-HEAD**, source; fountain; well-spring. **WELL-SINKER**, one who digs wells. **WELL SINKING**, the act or business of sinking wells. **WELL-SPRING**, a fountain; a source of continual supply. **WELL-WATER**, water drawn from a well. **ARTESIAN-WELL**: see **ARTESIAN-WELLS**.

WELL-A-DAY, *int.* *wēl'-ā-dā* [AS. *wá-lá-wá*, alas!—*lit.*, woe! lo! woe!]: an exclamation expressive of distress or grief; alas! oh me! also in *OE'*, **WEL'AWAY**, *int.* *-ā-wā*, from which **WELL-A-DAY** has been corrupted.

WELLES, *wēlz*, **GIDEON**: secretary of the navy: 1802, July 1—1878, Feb. 11; b. Glastonbury, Conn. He was educated at the Episcopal acad. at Cheshire, Conn., and at Norwich Univ., Vt., and afterward studied law; 1826-37 he was editor and part proprietor of the *Hartford Times*; member of the legislature 1827-35; postmaster at Hartford 1836-41; state comptroller 1842-46; and head of a bureau in the navy dept. 1846-49. He was one of the founders of the republican party, and chairman of the Conn. delegation to the Chicago convention that nominated Lincoln 1860; and was the indefatigable and efficient sec. of the navy during the whole of Lincoln's and Johnson's administrations. He died at Hartford.

WELLESLEY, *wēlz'li* (**RICHARD** [COLLEY] **WESLEY** or **WELLESLEY**), Marquis of: British statesman: 1760, June 20—1842, Sep. 26; b. at the town residence of his family, Grafton street, Dublin; eldest son of the first Earl of Mornington, and eldest brother of Arthur W., Duke of Wellington (q.v.). The family of W. was of Saxon origin, belonging to the county of Sussex, and was among the most anc. in Ireland, one of them having gone from England as standard-bearer to Henry II., who gave him large grants of land in Meath and Kildare. William de W. was in 1334 summoned to parliament as Baron Noragh. The name (originally *Welesley* or *Welseley*) was written Wellesley till the 16th c., when it became abbreviated into Wesley. The estates were bequeathed by Garrett Wesley to a connection by marriage, Richard Colley, who thereupon assumed the name Wesley, and who was grandfather of the Marquis of W. (the subject of this notice), and of the first Duke of Wellington. W. was educated at Eton, and at Christ-Church, Oxford, graduating from both in high

repute. In 1780 he gained the univ. prize for the best composition in Latin verse. His father having died in 1781, W., on attaining his majority, took his seat in the Irish house of peers; but, dissatisfied with the limited field which Ireland afforded, he obtained, 1784, a seat in the Brit. house of commons. In 1786 he became one of the lords of the treasury, and afterward rose high in the favor of George III. In 1797, Oct., he received a seat in the house of lords as Baron W.; and, at a most eventful period, was selected to go to India as gov.-general. Four powers then divided the sovereignty of India—the British; Tippoo Sahib; the Nizam; and the Mahrattas, comprehending Scindiah, Holkar, and the rajah of Berar; and w. India was the scene of invasion by Zemaum Shah. Tippoo hated the English, and meditated their expulsion; and the troops in the service of the Nizam and the Mahrattas were officered by Frenchmen. When W. arrived at Calcutta, 1798, May, Egypt had been conquered by Bonaparte; and the native powers of India, incited by the French, were unfriendly to British rule. His first operation was one of great boldness. Disregarding the remonstrances of the Madras Council, he ordered the Nizam to disband 14,000 men, surrounded them with a British force, secured the 124 Frenchmen by whom they were officered, and sent them instantly to Europe. Having annihilated French influence, he began the reduction of the empire of Mysore. 1799, Feb. 3, he ordered Gen. (afterward Lord) Harris to lead 20,000 men direct from the coast upon the Mysore capital; and W. removed to Madras, to be near the scene of this eventful operation. In one month the fortress of Seringapatam was taken, Tippoo Sahib slain, and his dominions partitioned. Having thus, in 15 months, destroyed French influence, struck terror into the native princes, and overthrown the most inveterate enemy of British rule in India, he returned to Bengal. In 1799 he was created by the king Marquis of W., and received the thanks of parliament. The E. India Company offered him £100,000 of the prize-money realized at Seringapatam; but he refused, disclaiming to be enriched out of military spoil. He afterward accepted an annuity of £5,000 voted him by the court of proprietors. His next step was to place the territories of the nabob of the Carnatic under the administration of the Company, in consequence of the treachery of that prince. He also concluded a treaty with Persia, to which he attributed ‘the fall of Zemaum Shah, the confusion of the Afghan government, and the repression of the annual project of invading Hindustan from Cabul’—then, as since, the nightmare of Indian statesmen. The Mahratta war broke out; the battles of Laswaree, Assaye, Argaum, and Delhi were fought; and Scindiah, the Berar rajah, and Holkar were stripped of their dangerous influence, and reduced to submission. A large accession of territory rewarded the gallantry of the army; and 1805 W. returned to England, after the most brilliant administration ever known in India. He had outshone even the native princes in the pomp and splendor of his progresses. He built the palace of Calcutta; founded

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and patronized the college for Indian literature; stimulated every attempt of natives and Europeans to bring to light the vegetable, mineral, and physical treasures of the 'golden peninsula;' and inaugurated those important financial reforms which in a brief period raised the revenue of the Company from 7 to more than 15 millions sterling. On his return there were naturally many complaints that his administration had been oppressive, especially toward the native powers; and articles of impeachment were even presented to the house of commons, though they were rejected with contempt. He declined a place in the Portland cabinet; and 1809 went to Spain as ambassador-extraordinary; landed at Cadiz on the day of the battle of Talavera, and Nov. 2 met his brother, the Duke of Wellington, at Seville. In 1809, Dec., he was appointed sec. of state for foreign affairs; in 1810 was elected a knight of the Garter. He was favorable, both in and out of office, to the repeal of the penal laws affecting the Rom. Catholics; and when, 1812, the prince regent refused to agree to a concession of Rom. Catholic claims, W. resigned his seat in the cabinet. During the first ten years of the administration of Lord Liverpool, he remained in opposition. He protested against the insufficiency of the means placed at the disposal of the Duke of Wellington, and did not cease to demand that he should be assisted to the utmost extent of the national credit and resources, until the duke had crossed the Pyrenees at the head of his victorious army, and brought the war to an end before Toulouse. After 1815 he began to ally himself with the more liberal section of the conservatives, who regarded Canning as leader, and he accepted the office of lord-lieut. of Ireland. Conciliation was to be the principle of his government, but he held office five years without effecting material amelioration, owing to hindrances from the state of the penal laws. He was recalled from Ireland by his brother the duke when he took office 1828. In 1833, in the 74th year of his age, W. went again to Ireland as viceroy, remaining until Sir R. Peel's administration 1834. In 1837 the directors of the E. India Company, in view of W.'s circumstances having become straitened, vested £20,000 in trustees for his benefit. In 1841 it was resolved that his statue should be erected in the court-room, as a mark of the admiration and gratitude of the East India Company. He died at Kingston House, Knightsbridge; and, in compliance with his will, was buried in the vault at Eton College Chapel. For an authentic record of his Indian administration, see *Despatches, Minutes, and Correspondence of the Marquis Wellesley, during his Administration in India* (5 vols. 8vo 1836), pub. at the expense of the E. India Company.

WELLESLEY COLLEGE.

WELLESLEY COLLEGE: institution for higher education of young women, founded 1875 by Henry F. Durant, a lawyer of Boston. It is in the town of Wellesley, Mass., 15 m. w. of Boston, on the Boston and Albany railroad; and the buildings are on elevated ground fronting Lake Waban ('Waban Water'), opposite the famous Hunnewell gardens. The grounds include 300 acres. The first and principal building is very stately and extensive, with accommodations for 312 students, besides recitation-rooms, library, chapel, etc.; Stone Hall has apartments for 107; six cottages have capacity for 10 to 51 each; many students find boarding-places in the village. The college is distinctly Christian in its religious exercises and influence, but not sectarian; and ministers of various denominations conduct the Sunday services. The charter entitles it to confer the usual collegiate and university degrees. The classical and scientific courses are distributed through 5 years, if combined with art or music; otherwise they are of 4 years each. After freshman year much elective work is allowed. Of special students those who complete a prescribed group of studies in two or more departments may receive certificates. Besides the usual courses in ancient and modern languages, provision is made for study of comparative philology, Sanskrit, Gothic, Old and Middle High German, Anglo-Saxon, Middle English, and Old French. Among the 22 courses of instruction are pedagogics and bibliography. There is an extensive school of music, in Music Hall, with 43 pianos and 2 large organs; and the school of art, with 5 courses of study, is in the art building (opened 1889), that bears the name of its donor, Isaac D. Farnsworth: it cost \$100,000, and contains rich collections in many departments of art. Lectures on art, music, literature, benevolence, and other subjects are given by professors and by invited speakers of distinction. The scientific courses, laboratories, libraries, apparatus, and collections are superior—e.g., there are no less than 99 costly compound microscopes, with objectives from $\frac{1}{25}$ in. down; a great astronomical equipment, however, is in the future. Health is provided for by free medical attendance and a hospital; and, besides boating on the lake and other athletic exercise, there is a gymnasium, with several courses of physical training, elective after the first year. Domestic science, an elective study, is taught by lectures, laboratory work, and visits of inspection. In the early days of the college, with a lower rate of tuition, much of the domestic work was done by the pupils; now an hour a day of the lighter work or of clerical service is required, but chiefly as mental and moral training. The libraries, endowed by Prof. Eben N. Horsford, of Harvard, number 53,000 bound vols.; and, besides the general, there are special libraries—mathematics, botany, physics, chemistry (with mineralogy and geology), Bible study and religious reading, art, music, a loan collection of text and ref. books, and the misc. Stone Hall library; many American and foreign periodicals are taken for the general library and for the reading-room. The student societies

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include a microscopical, Shakespeare, Beethoven, art, and two Greek-letter organizations, and a Christian association. Board, tuition, heat, and light make up a charge of \$350 per annum, with extra charges in the music and art depts. The Students' Aid Society appropriates about \$12,000 per year in loans and gifts, and there are 7 scholarships, each with a fund of \$5,000. Among the desiderata are general and special endowments, a chapel, more cottages, gymnasium, scientific building, and observatory. The calendar of 1895 gives 30 professors and 40 instructors and assistant teachers, those of music and art not included. In 1901-2 there were 86 instructors, 884 students (nearly all women), \$1,122,100 in grounds and buildings, and \$216,000 in scientific apparatus; total income \$253,847. The first pres. was Ada L. Howard. Her successors have been Alice E. Freeman, PH.D., LH.D.; Helen A. Shafer, M.A.; Susan M. Hallowell, M.A.; Julia J. Irvine, M.A., LITT.D.; Caroline Hazard, M.A., LITT.D.

WELLHAUSEN, *wěll'how-zěn*, JULIUS, D.D.; 1844, May 17— ———; b. Hameln-on-the-Weser, Germany: biblical critic. W. studied under Ewald at Göttingen (1862-65); became *privat docent* there in the theol. faculty 1870, and ordinary prof. of theology at Greifswald 1872. In 1882 he resigned his professorship because his change of views would not allow him longer to hold it conscientiously, and became prof. in the theol. faculty at Halle, then at Marburg (1885), and at Göttingen (1892). He is leader of the school of criticism that rejects the supernatural in the O. Test., treating it as a body of merely human literature, which it ascribes to others than their reputed authors, and to later dates than have been generally assigned to them. See HEXATEUCH: HIGHER CRITICISM. W.'s chief works are: *Der Text der Bücher Samuelis* (1871); *Pharisäer und Sadducäer* (1874); *Prolegomena zur Geschichte Israels* (Berlin 1878; Eng. transl. *History of Israel*, Edinburgh and London 1885); *Die Composition des Hexateuchs und der historischen Bücher des Alten Testaments* (1889); *Israelitische und jüdische Geschichte* (1894).

WELLINGBOROUGH, *wěll'ing-bŭr-rō*: market-town in England, county of Northampton; named from the medicinal springs in its vicinity; 64 m. n.n.w. of London. It has considerable trade in corn, and manufactures of boots and shoes.—Pop. (1881) 13,794; (1891) 15,068.

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WELLINGTON, *wěll'ing-ton*: city, cap. of Sumner co., Kan.; on the Atchison Topeka and Santa Fé, the Chicago Kansas and Nebraska, and the Southern Kansas railroads; 20 m. n. of Caldwell, 30 m. s. of Wichita, 225 m. s.w. of Kansas City, Mo. It is underlaid by a deposit of rock-salt 58 ft. thick, and is the natural gateway to Oklahoma and the Texas Panhandle. It is laid out regularly; has broad, well-paved streets, lighted by gas and two systems of electric lights, and traversed by 8 m. of railroad; and has natural drainage and a complete system of water-works. W. contains co. court house (cost \$75,000), 8 churches, public primary, intermediate, and high schools, 1 national bank (cap. \$50,000), business college opera-house, union passenger depot (cost \$25,000), several hotels, and 2 daily and 3 weekly newspapers. The industries comprise 3 roller flour-mills, 4 salt-mining plants, pork-packing establishments, carriage and wagon factory, planing-mill, sash and blind factory, foundry, etc. The salt-works have a capacity of 1,500 barrels per day of 99.40 per cent. pure salt. Pop. (1880) 2,694; (1900) 4,245.

WELLINGTON: small market-town of Shropshire, England; 11 m. e. of Shrewsbury, 151 m. n.w. of London; at the foot of the Wrekin. It is in a populous mining and agricultural district, with coal and iron mines, iron-works, limestone quarries, and wire-mills in the vicinity: in the town are smelting-furnaces, nail-works, and malt-kilns.—Pop. (1881) 6,217; (1891) 5,831; (1901) 5,300.

WELLINGTON, *wěll'ing-ton*: small market-town of Somerset, England; 7 m. s.w. of Taunton, 170 m. s.s.w. of London; at the foot of the Blackdowns, which are crowned by a Waterloo monument. The town gives title to the Duke of W. Blankets, serges, other woolen goods, and earthenware are manufactured.—Pop. (1891) 6,808.

WELLINGTON: town of New Zealand, chief town of a 'provincial district,' and since 1865 also cap. of the whole colony, the residence of the governor, and place of meeting of the 'General Assembly' or colonial parliament. W. was the first settlement of the New Zealand Company, and was planted 1840. The town is beautifully situated on a bay of Port Nicholson, itself an inlet of Cook's Strait, on the s. coast of the North Island. The surrounding country is richly wooded. The harbor is a fine expanse of water, six miles long and five broad, and has an excellent wharf, affording accommodation to ships of any tonnage, and considered one of the best in the Australian colonies. The town is growing rapidly; it has good public buildings; the streets are generally spacious, and have good dwelling-houses. W. possesses a cathedral, with about 30 other places of worship, in connection with the Episcopalians, Presbyterians, Methodists, Roman Catholics, and Jews. There are several banks and numerous insurance agencies. There is a railway to the interior, to connect ultimately with the lines already on the e. and w. shores. W. is also connected by steamers with the chief ports of New Zealand, and with Melbourne, Sydney, and Panama. Pop. (1881) 20,535; (1891) 31,021; (1901) 49,344.

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WEL' LINGTON, ARTHUR WELLESLEY, Duke of: one of England's greatest generals: b. 1769, in the last of Apr. or May 1; in Dublin, or at Dungan Castle, Meath, Ireland; died 1852, Sep. 14; third son of Garrett Wesley (first Earl of Mornington), and bro. of the Marquis of Wellesley (q.v.). He completed his military education, a few years before the French Revolution, in the military college of Angers, in France. He entered the Brit. army as ensign in the 41st regt. 1787, and became lieut.col. of the 33d 1793. In 1794 he embarked in command of the 33d regt., to join the Duke of York's army in the Netherlands. In this, his first term of actual service, he commanded three battalions on the retreat of the army through Holland, and distinguished himself in several repulses of the French. In 1796 he accompanied his regt. to India, where his brother, the Marquis of Wellesley, shortly afterward arrived as gov.gen. W. commanded the subsidiary force of the Nizam, when the reduction of the Mysore was decided upon, and his division defeated Tippoo Sultan's right flank at Mallavelly. At the assault and capture of Seringapatam, he commanded the reserve in the trenches. He was appointed to the command in Mysore, and took the field (1800) against Dhoondiah Waugh, a Mahratta freebooter, who was defeated and slain. He was named second in command of the expedition which sailed from India to assist the English army in Egypt, but was prevented from embarking by illness. In the Mahratta war of 1803 the young general won his first fame. After besieging and capturing Ahmednuggur, W., with only 4,500 men, came upon the combined Mahratta forces, 40,000 or 50,000 strong, and, not waiting for a larger Brit. force that was on its way, won the brilliant victory of Assaye (q.v.). The victory of Argaum followed, and the great fort of Gawulghur, supposed impregnable, having been taken in Dec., the Mahratta chiefs sued for peace, after one of the most extraordinary campaigns on record. W. was made K.C.B., and received the thanks of the king and parliament. In 1805 he returned to England, and in Nov. commanded a brigade in Lord Cathcart's expedition to Hanover. In 1806 he obtained a seat in the house of commons for Newport, Isle of Wight; and 1807, Apr., was appointed chief sec. to Ireland, the Duke of Richmond being lord-lieut. He held a command in the army under Lord Cathcart, and in the expedition against Copenhagen 1807; and after the affair at Kioge, negotiated the capitulation of Copenhagen. He received the thanks of the house of commons in his place, and returned to Ireland. In 1808 he commanded an expedition which sailed from Cork, the first division of the Brit. army sent out to assist in the expulsion of the French from Spain and Portugal. He landed at Corunna, and offered his aid to the army and people of Galicia; but the offer being declined, he finally landed 1808, Aug., with 10,000 troops, at the mouth of the river Mondego, in Portugal. The whole of n. Portugal was then in arms against the French. The affairs of Obidos and Roliça were quickly followed by the battle of

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Vimiero or Vimieira, in which he defeated Junot, who lost 3,000 men and 13 pieces of cannon. After this event W. signed the armistice which led to the Convention of Cintra (q.v.). Being superseded in the command of the army by men who were his superiors only in military rank and seniority, he returned to England. For the battle of Vimiero, he again, in his place, received the thanks of the house of commons. On the death of Sir John Moore, he reassumed (1809, Apr. 22) the command of the Peninsular army, resigning the office of chief sec. of Ireland. He had now to contend with Soult and Victor, who had entered Portugal at the head of a veteran army, and were in possession of its finest northern provinces. Oporto had been taken by Soult, and W. was desirous to bring him to action at once, that he might not make his retreat unharmed. W.'s passage, at Villa Nova, of the Douro, a wide, deep, and rapid river, in the face of a formidable enemy, who had removed every boat and barge to the opposite side of the river, was one of the boldest and most successful operations of the war. W. entered Oporto the same day, and followed the French army. He was now, by a decree of the prince regent of Portugal, proclaimed marshal-gen. of the Portuguese army. The French, under Victor and Sebastiani, had fallen back to a point where reinforcements were to meet them; and 1809, July 27, 28, they were defeated by the Brit. under W. at Talavera—a battle in which the slaughter on both sides was terrible. W. was unable to follow up his victory owing to the non-co-operation of the Spanish army under Cuesta; and his lack of supplies, as well as the junction of Soult, Ney, and Mortier in his rear, compelled him to fall back on Badajoz. The thanks of parliament were voted for the victory of Talavera, and Sir Arthur Wellesley was created (1809, Sep. 4) a peer by the titles Baron Douro of Wellesley and Viscount Wellington of Talavera, with a pension of £2,000. In 1810, May, the French collected under Massena in such superior force in his front that he fell back on Busaco, where he made a stand. Here the French (Sep. 27) made two attacks, but were repulsed with great slaughter. After this, he retreated to Torres-Vedras (q.v.), chiefly to the occupation of which line of defense, and his judicious method of maintaining it, may be attributed the ultimate success of the Peninsular war. Massena, unable to find subsistence for his army, began his retreat to Santarem, pursued by W., along the line of the Mondego. In 1811, Apr., he received the thanks of parliament for the liberation of Portugal. Spain, however, was now subdued by the French. The Spanish armies were annihilated, and it was of first importance that W. should be able to keep his rear open to the Tagus. W. having invested Almeida, Massena attempted to relieve it, but was skilfully repulsed at Fuentes de Onoro, May 3 and 5. The fall of Almeida followed, and W. ordered Badajoz to be invested. At this time, as at others, he had great reason to complain of lack of support and reinforcements from England. He had only the force which had

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followed Massena from Torres-Vedras, diminished by 9,000 men, *hors de combat* in so many sanguinary encounters. Writing to Marshal Beresford, he said: 'I inclose a dispatch from Lord Liverpool [then at the head of the home government]; I believe they have all gone mad.' The siege was carried on with vigor; but learning that Soult and Marmont designed to join their armies into one to relieve Badajoz, and his own inadequate force not justifying him in risking a battle, he raised the siege, and retired to the frontiers of Portugal. He next laid siege to the strong fortress of Ciudad Rodrigo, which was carried by storm, at night, 1812, Jan. 19. For this achievement he was created by the regency a grandee of Spain, with the title Duque de Ciudad Rodrigo. He again received the thanks of parliament, and a further pension of £2,000 a year, and was advanced in the British peerage by the title Earl of Wellington. He next marched toward Badajoz, invested it in March, and carried it by storm Apr. 6, after frightful carnage; the Allies losing nearly 5,000 men. In June he advanced to Salamanca, captured the convents there, which had been fortified by the French, and drove Marmont to the Douro. July 22 he gained at Salamanca one of his greatest military triumphs. Marmont extended his line, with the view of turning W.'s right; but the latter, perceiving that the enemy had thus weakened their left and centre, vigorously assailed those points, and, after obstinate resistance, put the whole army to rout. Ammunition, stores, two eagles, 11 pieces of cannon, and 7,000 prisoners, were the trophies of victory. The loss of the Allies was only about 700 killed and 4,000 wounded. Marmont lost an arm, and four French generals were killed. W. received the order of the Golden Fleece, entered Madrid, was made generalissimo of the Spanish armies, and was advanced in the British peerage by the title Marquis of Wellington. The thanks of parliament were again voted to him, with the sum of £100,000, to be laid out in the purchase of lands to be settled on him, his heirs and successors. In Sep. he marched to Burgos, but, failing to capture it, again retreated to the frontiers of Portugal. W. visited Cadiz and Lisbon, where he was received by the whole population. In May he marched his army into Spain in two columns, and June 21 gained, at Vitoria, another signal victory over the French, commanded by King Joseph assisted by Marshal Jourdan. The enemy lost 151 pieces of cannon and all their ammunition. The king's private carriage, letters, etc., fell into the hands of the victors. In exchange for the baton of Jourdan, which was found on the field, the prince regent forwarded to W. the baton of a field-marshal of England. By this splendid and important series of victories, he had reached the summit of martial glory. The deliverance of Spain from the French was now certain. His infantry were soldiers who would, in his own words, 'go anywhere and do anything;' and even the invasion of France itself seemed to his countrymen no longer chimerical. He pursued the French army to France by Pamplona. He failed,

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July 25, to carry San Sebastian by assault, but gained another decisive battle over Soult at the Pyrenees, and the French army retreated into France. A second attempt to carry San Sebastian by assault was successful, but it cost W. 2,300 in killed and wounded. He now crossed the Bidassoa, and invaded France. Pamplona surrendered. After the passage and battle of the Nivelle, and the passage of the Nive, the victorious army of W. was attacked, Dec. 10 to 18, on the left and right, by Soult, who was defeated. Leaving two divisions to blockade Bayonne, W. followed Soult with the rest of the army: 1814, Feb. 27, he defeated Soult at Orthes, and crossed the Adour. The affairs of Aire and Tarbes were followed by the passage of the Garonne; and, Apr. 10, W. consummated this series of brilliant victories by again defeating Soult under the walls of Toulouse. The allied Russian and German armies having entered Paris, and Napoleon having signed his abdication a few days before, this last battle would not have been fought but for the non-arrival of news of the events of Paris. In a few weeks W. was in Paris, presenting the trophies of his brilliant campaign to the allied monarchs. He was created, May 3, Marquis of Douro, and Duke of W. in the Brit. peerage, and received an additional grant of £400,000. He received for the 12th time the thanks of parliament for his services, and on his arrival in England was greeted with the utmost enthusiasm. June 28 he took his seat for the first time in the house of lords. He next returned thanks at the bar of the house of commons, and was addressed by the speaker. He was appointed ambassador-extraordinary to the court of France 1814, July, whence he proceeded to the Congress of Vienna. Napoleon having escaped from Elba, the congress was abruptly broken up. W. was appointed commander of the Brit. forces on the continent of Europe, and from Vienna joined the army at Brussels. It appeared probable that Napoleon would make a bold advance into Belgium, and its defense was assigned to an Anglo-allied army under W., and a Prussian army under Blücher. The battles of Ligny (q.v.) and Quatre-Bras (q.v.) were succeeded 1815, June 18, by the great battle of Waterloo (q.v.). Here the grand and decisive blow was struck; here for the first and last time the emperor and the great English gen. met and measured swords; and here the power of Napoleon was finally crushed. The allied armies, under W. and Blücher, marched on Paris; the French army evacuated Paris under a convention; and Louis XVIII. entered Paris the very day after the English army. Marshal Ney was brought to trial. He relied on the terms of the capitulation of Paris, and appealed in vain to W., who denied that the French king was bound by the convention—a reading which it is impossible to justify, as Sir A. Alison has shown in his *History of Europe*. At the request of the allied sovereigns, W. took command of the army of occupation, and resided in Paris 1815–18. Two attempts were, during this period, made upon his life: gunpowder was placed in his cellar for explosion; and one Cantillon

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discharged a pistol into his carriage; for which attempt at assassination, Napoleon I. left the miscreant a bequest in his will. When the allied armies evacuated France 1818, the emperors of Russia and Austria, and the king of Prussia, created W. a field-marshal of their armies. He was created Prince of Waterloo by the king of the Netherlands. The gratitude of the British nation was, meanwhile, enthusiastically manifested. Statues were raised to his honor in the metropolis. Parliament voted £200,000, in addition to former grants; and the mansion and estate of Strathfieldsaye were purchased, to be held by W. and his heirs. The office of master-gen. of the ordnance, now abolished, but then comprehending the control of the artillery branch of the service, was conferred on him. At the coronation of George IV., 1821, he officiated as lord high constable of England. In Oct. he attended George IV. to the field of Waterloo. In 1822 he represented Great Britain at the Congress of Verona, where he ineffectually exerted his influence to prevent the invasion of Spain by a French army, in support of absolutist principles. In 1826 he went on a special embassy to St. Petersburg, when he induced Emperor Nicholas to act in common with England and other powers, as mediators in the quarrel between Turkey and Greece. On his return he was appointed constable of the tower. In 1827 he succeeded the Duke of York as commander-in-chief of the army, and was made col. of the grenadier guards.

From this period his political career may be said to begin. When Canning received the commands of George IV. to form an administration, W., with six other members of the Liverpool administration (including Lord Eldon and Peel), resigned office. In the explanations which he gave, he emphatically denied that he had entertained the ambition of himself filling the post of first minister; and said he felt his incapacity for such an office so strongly that he should have been 'mad' if he had coveted it. In 1827, Aug., after Canning's death, W. again accepted the command of the army, which he resigned on being called by George IV., 1828, Jan. 8, to form an administration. Of strong tory politics, he was, nevertheless, the first minister to cede to the growing popular power. The Test and Corporation Acts were repealed, and the removal of the Rom. Cath. disabilities was the first measure proposed by W. in the following session, on the ground of the formidable attitude of the people of Ireland and the danger of civil war. This measure involved him in a bloodless duel with the Earl of Winchelsea. The French revolution of 1830 appears to have influenced him in making a firm stand against parliamentary reform in the same proportion that it raised the demands of the people for it; and when the struggle of continental Europe to emancipate itself from arbitrary government strengthened the popular cry for 'parliamentary reform,' he chose the earliest moment to declare the unalterable perfection of the representative system of the country, and the determination of his government to resist all measures of parliamentary reform:

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see REFORM, PARLIAMENTARY. His unpopularity became excessive; and anticipating a defeat in the house of commons, on Brougham's proposition for a reform, W. resigned office, and was succeeded by Earl Grey. He had meanwhile become lord warden of the Cinque Ports. Under the administration of Earl Grey, W. held no office. He strenuously opposed the Reform Bill, and a London mob broke the windows of Apsley House, and hooted and pelted him in the streets. In 1834, Jan., he was elected chancellor of the Univ. of Oxford. On the enforced resignation of Lord Melbourne, 1834, Nov., he was sent for by William IV. He declined to take the premiership, and was intrusted by the king with the whole charge of the government, and the seals of the three secretaries of state, until Sir R. Peel could arrive from Rome. Peel constructed a conservative government, in which W. took the office of foreign sec. In 1835, Apr., Peel resigned, and henceforward W. ceased to take a prominent share in the civil government of the country. He gave a generous welcome to Soult, who represented France at the coronation of Queen Victoria, and was received with great cordiality by the people on this occasion. In 1839, Aug., a grand banquet was given to him at Dover, as lord warden of the Cinque Ports, on which occasion Lord Brougham proposed his health in a brilliant eulogium. In 1841 he accepted a seat in the cabinet of Sir R. Peel, without office. In 1842 the queen visited him at Walmer Castle, and in the same year he was reappointed to the command of the forces. In 1845 he doubted the policy of repealing the Corn Laws; but in conformity with his usual practice of considering 'how the queen's government was to be carried on,' he determined to stand by Sir R. Peel in his attempt to abolish them. W. not merely consented to remain in the cabinet, but accepted the higher office of pres. of the council in lieu of the post of lord privy seal. When the bill came up to the lords, W., with great emotion and earnestness, warned the peers not to reject the bill, and never to separate themselves from both the crown and the house of commons. His speech made a great impression, and the bill passed a second reading by a considerable majority. He retired with the Peel government 1846, July. After this event he may be said to have withdrawn from political strife; and it is evident that his share in the repeal of the Corn Laws cast a halo of popularity around the remainder of his life. In 1848 he called attention to the unsatisfactory state of the national defenses, in a letter to Sir J. Burgoyne. As commander-in-chief, he directed great preparations to be made to prevent a Chartist outbreak on Apr. 10. The few remaining years of the old hero were calm and peaceful; the old strife had ceased, and the echoes of his transient unpopularity had long died away, leaving him venerated and beloved by the whole nation. In his 84th year he was seized at Walmer Castle with an epileptic fit, became speechless, and died the same afternoon. His remains were honored by a public funeral, and were laid to rest in St. Paul's Cathedral, by the side of those of Lord Nelson.—His

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Despatches, pub. by Col. Gurwood, 12 vols., are the best monument of his glory; they exhibit him as a commander who overcame countless difficulties by honesty, sagacity, singleness and constancy of purpose, and devotion to duty. Throughout his long career, he appears the same honorable and upright man, devoted to the service of his sovereign and country, just and considerate to all who served under him. As a general, he was cautious, prudent, and careful of the lives of his men; but when safety lay in daring, as at the battle of Assaye (q.v.), he could be daring in the extreme. He had an iron constitution and was not more remarkable for his personal intrepidity than for his moral courage: the union of these qualities obtained for him the appellation 'the Iron Duke,' by which he was affectionately known in his later years. His parliamentary oratory was plain and to the point. He spoke without fluency or art, yet his strong sense and practical sagacious judgment gave him great weight with his brother-peers. His tastes were aristocratic; and his aides-de-camp and favorite generals almost all were men of family and high connections. Altogether, he was a grand type and model of an Englishman; and in the general order issued by the queen to the army, he was characterized as 'the greatest commander whom England ever saw.' He married, 1806, the second daughter of the third Earl of Longford, and by her (died 1831) he left two sons—Arthur Richard, second Duke of W. (who also inherited the earldom of Mornington), and Charles, deceased, whose son, Henry Wellesley, is heir-presumptive to the title.

Colonel Gurwood's *Despatches of the Duke of Wellington*, 12 vols.; Gurwood's *General Orders of Duke of Wellington*, 1809–18; Napier's *History of the Peninsular War*; Alison's *History of Europe*; Thibaudeau, *Histoire de l'Empire*; Thiers, *Histoire de l'Empire*; Marquis of Londonderry's *Narrative of the Peninsular War*, 1808–13; Gleig's *Life of Arthur, Duke of Wellington*; Bourrienne's *Mémoires sur Napoleon*; Las Casas, *Mémorial de Ste.-Hélène*; *La Vie de Wellington*, by Brialmont; *Speeches in Parliament of Duke of Wellington*; Sir R. Peel's *Memoirs*, by his Literary Trustees; *Supplementary Despatches and Memoranda of Field-marshal Arthur, Duke of Wellington*, edited by his son, the Duke of Wellington, 14 vols. (1858–75); also, in continuation of the above, *Despatches, Correspondence, and Memoranda of Field-marshal Arthur, Duke of Wellington*, 8 vols. (1867–80).

WELLINGTON BOOTS [after the first Duke of Wellington]: boots which reach half-way up the leg.

WEL'INGTON COLLEGE: school near Wokingham, Berkshire, England; founded 1853, in memory of the Duke of Wellington, from funds raised by public subscription. It is for education of sons of deceased officers of the army. There are more than 20 masters and about 400 pupils. The foundationers are boarded and educated free of charge; non-foundationers pay £110 per annum.

WELLINGTO'NIA: see SEQUOIA

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WELLS, *wělz*: ancient city and municipal borough, county of Somerset, England; pleasantly situated at the foot of the Mendip Hills; 15 m. s.w. of Bath. It is a clean and cheerful town, with runlets of water flowing through each principal street. The cathedral, a remarkably beautiful edifice, begun 704, enlarged 1138, is for the most part in Early English; but its w. front, one of the noblest façades in the kingdom, and enriched with 300 statues, is in Gothic. The bishop's palace, founded 1088, is surrounded by a moat supplied from the abundant source of St. Andrew's Well—from which the town is said to derive its name—and by lofty walls. There are no manufactures, and the trade is chiefly retail.—Pop. (1871) 4,518; (1881) 4,634; (1891) 4,822.

WELLS, *wělz*, CLARK HENRY: naval officer: 1822, Sep. 22—1888, Jan. 28; b. Reading, Penn. He became midshipman in the U. S. navy 1840; studied at Annapolis, and became passed midshipman 1846; in the Mexican war served in the fleet that protected Gen. Scott's landing and that bombarded Vera Cruz; took part in the expeditions to Tampico and Tuspan. He was promoted master 1855, Mar., and lieut. Sep., and served on the frigate *Niagara* in laying the first Atlantic telegraph cable. In the civil war he had a share, as executive officer of the *Susquehanna*, in the capture of Port Royal, S. C.; and afterward commanded several boat expeditions in S. C., Ga., and Fla. waters. He became lieut.-commander 1862, July; was executive of the Philadelphia navy-yard 1863, and commanded the steamer *Galena* in the w. Gulf blockading squadron 1863-4. For his gallantry and skill at the battle of Mobile he won the highest praise from Admiral Farragut. He commanded the *Kansas* on the Brazil station 1865-6; was commissioned commander 1866, July 25; capt. 1871, June 19; commodore 1880, Jan. 22; rear-admiral 1884, Aug. 1; and was placed on the retired list 1884, Sep. 22.

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WELLS, DAVID AMES, LL.D., D.C.L.: economist: b. Springfield, Mass., 1828, June 17; lineal descendant of Thomas Welles, gov. of Conn., and of David Ames, who established the national armory at Springfield. W. graduated at Williams College 1847; was employed in the editorial office of the *Springfield Republican* 1848; the same year invented a machine for folding newspapers and other printed sheets; entered the Lawrence Scientific School of Harvard, conducted by Louis Agassiz; graduated there 1851, and remained in the institution as assistant. He edited and pub. at Cambridge, in association with George Bliss, the *Annual of Scientific Discovery* 1849-66. He had a financial interest in the publishing firm of G. P. Putnam & Co., New York, 1857-8. Dr. W. was for many years a resident of Norwich, Conn. He prepared and published a great number of essays and compilations on economic and other subjects—e.g., *Science of Common Things; Principles, etc., of Chemistry; First Principles of Geology; Our Burden and Our Strength* (this had a circulation of about 200,000 copies); *The Creed of the Free-trader; Production and Distribution of Wealth*; and very many more. He served on many important public commissions under federal and state authority. He zealously advocated free trade. Dr. W. died 1898, Nov. 5.

WELLS, HORACE: dentist: 1815, Jan. 21—1848, Jan. 24; b. Hartford, Vt. He began to study dentistry in Boston 1834, and 1836 began practice in Hartford, Conn. He made experiments to discover an anæsthetic agent for use in his art, and, 1840 believed that he had found it in nitrous oxide, yet did not do anything to bring nitrous oxide into general use. Dr. Gardiner Q. Colton administered the gas to several persons at a public lecture in Hartford 1844, and W. had one of his own teeth extracted by Colton while under the influence of the anæsthetic. He now began to use it in his practice, and in order to introduce it to the notice of physicians, surgeons, etc., throughout the country, communicated to Drs. William T. G. Morton, Charles T. Jackson, and John C. Warren, all of Boston, the results of his researches. Later, Morton and Jackson claimed the discovery, and applied to the U. S. govt. for a patent-right. Despite the protest of W., letters patent were duly issued, 1846, Nov., to Morton and Jackson: but see **MORTON, WILLIAM THOMAS GREEN.**

WELLS, WILLIAM: soldier: b. Waterbury, Vt., 1837, Dec. 14. At the beginning of the civil war he was in mercantile business, but 1861, Sep., he enlisted in the 1st Vt. cav.; Oct. 14 was made 1st lieut.; Nov. 18 promoted capt.; and 1862, Oct. 30, major. He served under Banks in his Shenandoah campaign, under Pope in his Virginia campaign; and 1864, Aug—1865, Mar., with Sheridan in the Shenandoah valley. In 1864, June 4, he was commissioned col.; 1865, Feb. 22, brevetted brig.gen.; Mar. 30 brevetted maj.gen.; and May 19 received a full commission as brig.gen. He was mustered out of service 1866, Jan. 15. He afterward served in the legislature of Vt., and was collector of internal revenue. He d. 1892, Apr. 20,

WELLSTON—WELSER.

WELLSTON, *wèlz'ton*: town in Jackson co., O.; on the Baltimore and Ohio (southwest), the Cincinnati Dayton and Ironton, and the Ohio southern railroads; 35 m. s.e. of Chillicothe. It is in a coal and iron mining region; contains the works of the Wellston Coal and Iron Co., several iron foundries, machine-shops, and various mills; and has 1 national bank (cap. \$50,000) and 2 weekly newspapers. Pop. (1880) 952; (1890) 4,377; (1900) 8,045.

WELLSVILLE, *wèlz'vîl*: town in Columbiana co., O.; on the Ohio river, and on the Cleveland and Pittsburgh railroad; 48 m. w.n.w. of Pittsburgh. It is in an agricultural region; but has important manufactories, producing iron, steel, and terra-cotta goods. There are 8 churches, union school, 2 nat. banks (cap. \$111,490), 1 private bank, and 2 daily newspapers. Extensive railroad repair-shops are here. Pop. (1880) 3,377; (1900) 6,146.

WELSER, *vêl'sér*: famous extinct patrician family in Augsburg.—**JULIUS W.** was knighted by Emperor Otto I. for his services in the war against the Hungarians.—His son **OCTAVIAN W.** settled in Augsburg, and from him descended the patrician family, which always held important posts in the council of that town.—**BARTHOLOMEW W.**, privy councilor of Emperor Charles V., was so wealthy that he could vie with the Fuggers (q.v.) in munificence. With the emperor's permission, 1526, he fitted out three ships in Spain, which, under command of Ambrose Dalfinger, of Ulm, sailed for America, and took possession of the province of Caracas, which the emperor gave W. in pledge. Twenty years after this, the Welsers gave up their possession voluntarily, and it reverted to Spain.—The most famous of the family was the niece of Bartholomew W., **PHILIPPINE W.**, daughter of his brother **Franz W.** (about 1530–80). She had received an excellent education from her mother, and was exceedingly beautiful. On the occasion of a diet of the empire at Augsburg 1547, she was seen by Archduke Ferdinand (second son of the subsequent emperor, Ferdinand I.), who fell in love with her. The young girl firmly rejected all the advances of this fiery youth of 19, and refused any relation with him except marriage. They were therefore married 1550, without the knowledge of his father, or of his uncle, Charles V. His father, hearing of the marriage, was exceedingly angry, and for a long time his son did not venture to appear before him. Meanwhile the loving couple had great domestic happiness, and Philippine enchanted every one that knew her by her intelligence and kindness of heart. It was only after eight years that his father was reconciled. Philippine, in disguise, herself handed him a petition, and by her deportment on the occasion, as well as her beauty, disarmed the angry father: he forgave his son, declared his children legitimate, and raised their mother to be Markgravin von Burgau. The portrait of the lovely Philippine is still shown in the palace at Schönbrunn.

WELSH—WELSHER.

WELSH, a. *wěłsh* [AS. *wealh*, foreign: OHG. *walah*, a foreigner]: of or pertaining to Wales or its people: N. the people of Wales or their language. **WELSH POPPY**, a yellow flower, *Meconopsis cambrica*, natural order *Papaveracęæ*. **WELSH-RABBIT** [corruption of *Welsh rare-bit*]: melted cheese laid on toasted bread and highly seasoned.

WELSH, HERBERT: helper of the Amer. Indians: b. Philadelphia, 1851; son of John W., U. S. minister to England. He graduated at the Univ. of Penn. 1871. He has since devoted much time to the study of the Indian question, writing and lecturing on the legal and social position of the Indians, and advocating their rights under the government. Through his efforts the National Indian Rights Assoc. was established in Philadelphia 1883, of which he is secretary. In this official position he was instrumental in obtaining the appropriation for the starving Piegans of Montana 1885. He also succeeded in having revoked the order of Sec. Teller opening to settlement the Crow Creek and Old Winnebago reservations. At numerous points, for many years, he has stood as a watchful and courageous guardian of an almost friendless race.

WELSH, JOHN: merchant: 1805, Nov. 9--1886, Apr. 10; b. Philadelphia. He received a liberal though not collegiate education, and a good business training in his father's counting-house. In 1854 he entered into partnership with his two brothers in the W. India sugar-trade, and was the senior member of the firm at his death. He held many positions of honor and trust in Philadelphia, among them chairman of the finance committee of the Centennial Exhibition. For his valuable services in this position, the citizens of Philadelphia gave him a gold medal, and gave \$50,000 to endow the John Welsh centennial professorship of hist. and Eng. lit. in the Univ. of Penn. In 1877 Pres. Hayes appointed him minister to England, but he resigned in 1879. He died in Philadelphia.—His brother **WILLIAM W.**, merchant (1810-78), b. Philadelphia, was prominent in philanthropic and reformatory efforts in the city; was a member of the Indian peace commission during Grant's administration, and pub. works on the Indian question and on Episc. church work.

WELSH, THOMAS: soldier: 1824, May 5—1863, Aug. 14; b. Columbia, Penn. At the beginning of the Mexican war he enlisted as a private, but was promoted lieut. for gallantry on the field at Buena Vista, where he was wounded. At the three months' call for troops in the civil war he entered the service as capt., but was elected lieut.-col. of the 2d Penn. regt. At the expiration of the three months he re-entered the service as col. of the 45th Penn. regt. He commanded a brigade at South Mountain, Antietam, and at Fredericksburg. For his services at Fredericksburg he was commissioned brig.gen. of vols. He was subsequently transferred to the west with the 9th army corps, and took part in the siege of Vicksburg. He died at Cincinnati, O., from malarial fever, while on his way home after the fall of Vicksburg.

WELSHER: see **WELCHER**,

WELSH LANGUAGE AND LITERATURE.

WELSH LANGUAGE AND LITERATURE: the language and literature of the people of Wales (q.v.), and of the ancient Britons from whom they are sprung. Celtic languages are divided into two groups, Gaelic and Cymric. To the latter of these the Welsh belongs, and has even given name, as forming the most important member of the group; which comprises also Armorican (spoken in Bretagne) and Cornish (extinct). A controversy has been waged concerning the nature and closeness of the intimacy between the Gaelic and Cymric tongues, but the question may be considered settled by the researches of the Rev. Richard Garnett (*Gentleman's Magazine*, 1839, May), who found, on examining the monosyllabic words in the introductory part of Neilson's *Irish Grammar*, that, out of 270, no fewer than 140 were identical in sense and origin with corresponding Welsh terms, that 40 were cognate, 40 others borrowed from Latin, Saxon, etc., and that only 50 were peculiar to the Gaelic. Nevertheless, it is not to be supposed that the affinity is as close as between English and so-called Scotch: it is rather (according to Garnett) such as exists between Icelandic and German. A Welshman cannot understand a Highlander or an Irishman; he cannot understand even a Breton (as used to be believed), though the language of the latter is undoubtedly Cymric. Extraordinary hallucinations were formerly current in regard to the antiquity of the Cymric tongues. Pezron, Breton investigator, gravely affirmed that Welsh and Armorican (which he considered the same) had been 'the language of the Titans—i.e., the language of Saturn, Jupiter, and the other principal gods of heathen antiquity.' The Rev. Joseph Harris, ed. of the *Seren Gomer*, remarked 1814 that 'it is supposed by some, and no one can disprove it, that Welsh was the language spoken by Adam and Eve in Paradise.' The *fact*, on the other hand, is, that, of the two branches of Celtic, the Cymric is less ancient than the Gaelic, and that among the Cymric tongues the Cornish is probably older than the Welsh. (See Norris, *Ancient Cornish Drama*, Oxford 1859). Still, doubtless the Welsh is one of the oldest living languages in Europe, and possesses a literature reaching back to remoter times than that of any other modern tongue except Irish. The most striking peculiarities of the language are the abundance of its grammatical permutations, and its facility in forming derivatives and compounds. Of the former, two examples may serve for illustration. The Welsh word for 'father' is *tad*; for 'my,' *fy*. But you cannot say, as meaning 'my father,' *fy tad*. After *fy*, every word beginning with *t* must change the *t* to *nh*; and therefore the correct phrase is *fy nhad*. So after *ei*, *tad* becomes either *dad* or *thad*, according as *ei* means 'his' or 'her.' The rules of permutation are almost endless; and, in the opinion of such Welsh scholars as are not Welshmen, useless, as nothing is gained in euphony or expressiveness. The Welsh affirm that their language is exceeding harmonious, and it would serve no good purpose to dispute the assertion, but foreigners ignorant of the tongue, and associating no defi-

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nite ideas with the words that issue from a Welshman's lips, generally fail to perceive the fact, and consider it in this respect—though not in others—distinctly inferior to Gaelic. The language, or rather the structure of sentences and the phraseology, exhibits a certain stateliness, or even grandiloquence, characteristic, indeed, of uncivilized nations. Specially noticeable is the fact that the Welsh people are profoundly attached to and familiar with it. It is not dying out, like Irish or Scotch Gaelic. It has a genuine literary as well as oral existence even now; and though the changes that it has undergone since the days of Taliesin are numerous and great—so great, indeed, that no modern unlettered Cambrian can understand a word of the early poetry of his country—yet it is essentially the same tongue as Cæsar and Agricola heard, and is consequently to be regarded with veneration as the solitary living link that unites those distant ages with our own.

There are extant, says Owen Pughe, about 30 old treatises on Welsh grammar and prosody. The most important was by Geraint (880), revised by Einion (1200), and regularly privileged by the sovereigns who then exercised authority in Wales. It was printed first by the Welsh MS. Soc., 1856, under the editorship of the Rev. J. Williams ab Ithel. Among Eng. grammars of the Welsh language, the best is said to be that by the Rev. Thomas Rowland (2d ed. 1857); among dictionaries, that of Owen Pughe, entitled *Geiriddur Cymraeg a Saesoneg, a Welsh and English Dictionary*, 2 vols. (1793; 3d ed. 1861, *et seq.*). It is, however, only a Welsh-Eng. dictionary; the most satisfactory Eng.-Welsh dictionary was pub. by Daniel Silvan Evans, 2 vols. (Denbigh 1852-58).

The literature of Wales has been arranged into four periods—the *first*, from the earliest times to the Norman Conquest (1066); the *second*, from the Norman Conquest to the Eng. Reformation (about 1536); the *third*, from the Eng. Reformation to the beginning of the reign of George III. (1760); the *fourth*, from 1760 to the present day.—To what date the oldest specimens of Welsh literature ought to be assigned, has been the subject of sharp dispute. These specimens are in verse, rhymed. The chief of their alleged authors, with their supposed periods, are Aneurin (510-560), Taliesin (520-570), Llywarch *Hen*, or 'the Old' (550-640), and Myrddin or Merlin (530-600). According to Pinkerton (see his preface to *Barbour*) and Laing (*Dissertation on Ossian*), they are not authentic; but the vindication of their authenticity, first by Sharon Turner 1803, afterward more critically by Stephens of Merthyr-Tydvil, in *Literature of the Kymry* (1849), and by Nash, in *Taliesin, or the Bards and Druids of Britain* (1858), is considered conclusive. The last two of these writers, however, may almost be said to meet their opponents half-way. Of the 77 poems ascribed to Taliesin in the *Myvyrian Archæology of Wales* (collection of all the most celebrated works in Welsh literature, 500-1400), which appeared 1801, Stephens considers 57 demonstrably spurious, and only 12 probably genuine—i.e., belonging to the age of Taliesin.

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Nash enables us to form an independent judgment on the point, for he translates about 50 of these poems, and we find that, instead of their exhibiting an antique Welsh character, they abound in allusions to mediæval theology, and frequently employ mediæval Latin terms. It is unfortunate for the reputation of the 'Chief of the Bards' that the specimens of his which *are* considered genuine possess exceedingly small poetic merit. The life of this famous but apparently overrated genius is enveloped in legend. He is said to have been son of a certain St. Henwg, and to have been educated at the College of St. Cadog. His life was spent successively at the courts of Urien Rheged, Gwyddno, Prince of Cardigan, and King Arthur; and his sepulchre, shown near Aberystwith, is still called *Bedd Taliesin* (Taliesin's Grave). Of the poems whose authorship is ascribed to Aneurin, prince of the Cumbrian Britons, the most notable is that entitled *Gododin*, in which he pathetically laments a defeat of his countrymen by the Saxons: it is reckoned authentic. (Several Eng. translations of the *Gododin* have been pub., and a transl. of the works of Aneurin was pub. by Probert 1820.) Llywarch Hen, also a Cumbrian warrior, is regarded as the finest and most poetical of all the semi-historical Welsh bards: tradition reports that he lived to the age of 150. The burden of his verse is the miseries of old age, on which he descants with melancholy eloquence. (See *The Heroic Elegies and other Pieces of Llywarch Hen, Prince of the Cumbrian Britons*, with literal transl. by William Owen, 1792.) The pieces ascribed to Merddyn in the *Myvyrian Archæology* are probably spurious. Besides the names above, other poets of the first period are Gwyddno, Gwilym ab Don, Golyddan, etc.

The earliest specimen of Welsh prose extant is the collection of the laws of King Hywel Dda, or Howel the Good (d. 748)—of great value in illustrating the manners and morals of early Welsh times; but it is very uncertain when or by whom the collection was made. The oldest extant MS. belongs to the 12th c. The latest and most critical ed. (Welsh and Eng.) was pub. 1841 by the Record Commission, and edited by Aneurin Owen, son of Dr. Owen Pughe. Another work, *The Wisdom of Cadog the Wise* (collection of proverbs pretending to be by a St. Cadog, 6th c., a friend of Taliesin), is of doubtful authenticity.

Second Period (1066–1536).—A few years after the Norman Conquest, a new spirit was imported into Welsh poetry by the influence of Gruffydd ab Cynan, Prince of N. Wales, and Rhys ab Tewdwr, Prince of S. Wales. Gruffydd, b. during his father's exile in Ireland, was brought up in that country, where he appears to have acquired familiarity with both the native Celtic literature and that of the Dano-Norse invaders. In 1100 he held a great Eisteddfod at Caerwys, in N. Wales, numerous attended by Irish bards and musicians. For the next 300 years, Wales is rich in native bards—a fact that conclusively refutes the tragic story of Edward I. having caused

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them all to be slain, lest their patriotic songs should stir the Welsh to renew the struggle for independence. Nearly 60 names occur in the *Myvyrian Archæology* 1120-1380. The first is that of Meilyr (1120-60), whose best piece is *The Deathbed of the Bard*. Meilyr's son, Gwalchmai ab Meilyr (1150-90), said to have accompanied Richard Cœur de Lion to Palestine, is a superior poet to his father: 14 of his productions are extant. Gwalchmai's son, Einion (1170-1220), also figures as a poet. Forty pieces are ascribed to Cynddelw (1150-1206), contemporary of Gwalchmai, of which probably the most interesting is *The Deathbed of Cynddelw*. He has also some verses addressed to Prince Madog or Madoc of Powys, whom enthusiastic Welshmen conceive to have discovered America before Columbus. Other bards of this second period are Llywarch ab Llewellyn (1160-1220); Hywel (1140-70), brother of Prince Madoc, and writer chiefly of erotic odes; Owain Cyveilioe (1150-97), also of princely rank, whose *Hirlas*, or the *Long Blue Horn*, is a favorite with Welshmen and with others; and above all, *Davydd ab Gwilym* (about 1340-1400), who has been compared to Ovid, to Petrarch, and to Burns. In his verses, Welsh poetry undergoes a change—the bardic or Scaldic spirit disappears, and a more humane, if less patriotic, spirit takes its place. Davydd sings of love and social amusements; he was likewise a fierce satirist, though at times very penitent and pious; while, to complete his resemblance to the Scottish poet, he showed predilection for illicit love. Davydd's poems were published in Welsh first, with a biography of the author by Owen Jones and Owen Pughe (1789). An Eng. translation of some by A. Johnes appeared 1834. Besides the poets above mentioned, the following names are in high repute: Iolo Goeh, friend and bard of the famous Owen Glendower, who is said to have lived to the age of 120; Sion Cent ('John of Kent') (1380-1410), who, having adopted the opinions of the Lollards, ultimately attained the reputation of a wizard; and Lewis Glyn Cothi, who lived during the Wars of the Roses, and was married to Jasper, Earl of Pembroke, son of Owen Tudor and of the widow of Henry V.

Prose.—The oldest Welsh chronicler of the second period is Caradoc, monk of Llancarvan, first half of the 12th c. His work narrates in Welsh the history of his native country from the death of Cadwallader, 689, to the times of Caradoc himself: it is dry and illiterate, like the Anglo-Saxon Chronicle. Contemporary with Caradoc was the famous Geoffrey of Monmouth (q.v.), Bp. of St. Asaph: d. 1154. He, however, though a Welshman, wrote in Latin, and belongs, therefore, rather to the general literature of England. His *Chronicle* begins with the fall of Troy, and ends with the death of Cadwallader, so that it forms an introduction to that of his friend Caradoc. In it the legend of Arthur first assumes that romantic and chivalrous form in which modern readers are familiar with it. It is impossible here to enter into a discussion of the question where the materials of the Arthurian romance were first accu-

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culated; suffice it to say, that evidence preponderates in favor of their Welsh origin. To this *second* period must be assigned also that charming collection, the *Mabinogion*, or Children's Tales, of which a MS. vol. of more than 700 pages is in the library of Jesus College, Oxford, and is known as the *Red Book of Hergest*, from the place where it was discovered. A beautiful ed. of this work in Welsh and Eng., with preface and notes, was pub., 3 vols. (1838-49), by Lady Charlotte Guest. The age of these tales, which relate principally to Arthur and the Round Table, is doubtful. The transcription in the *Red Book of Hergest* belongs probably to the 15th c.; but the date of their composition may be safely fixed much earlier, perhaps in the 13th century.

The *Triads* also may be here noticed: they are collections of historical facts, maxims ethical and legal, mythological doctrines and traditions, and rules for the structure of verse; all expressed with extreme brevity, and regularly disposed in groups of three. They were a very popular species of composition among the Welsh, and are of all ages. Examples occur in the poems of Llywarch Hen, but the greater part are found in transcripts and miscellanies of the 16th and 17th c. The 'historical' triads are especially puzzling. They occur in a so-called collection by Thomas Jones of Tregaron, about the close of the 16th c. This Jones was originally, it seems, an eminent robber—a Welsh 'Rob Roy;' but in his later years he reformed, married an heiress, became a justice-of-peace for the county of Brecon, and d. about 1620. The peculiarity of his 'Collection' is, that it gives a totally different account of the origin of the Britons from Geoffrey of Monmouth, bringing them from a 'Summer Land' (supposed to be Constantinople or the Crimea) over a sea called the 'Hazy Sea.' The question arises, and has not been settled, whether we are to suppose Jones the fabricator of these 'triads,' or his account of the origin of the Britons the genuine record of an ancient tradition. In favor of the former hypothesis, unfortunately, is the circumstance that there is no trace of such an ancient tradition in the anterior literature of Wales.

Third Period (1536-1760).—The most notable fact in the beginning of this period is the comparative ease with which the Reformation made its way among the Celts of Wales. The Celts of the Highlands remained for a time, and those of Ireland remain to this day, obdurate adherents of the old faith; but those of Wales, on the whole, swiftly accepted the new religion. The art of printing had been in operation in England more than half a century before it was applied to the Welsh language. The first book printed in the Welsh or any Celtic language was an almanac, with translation of the Lord's Prayer and the Ten Commandments (Lond. 1546). The author, William Salesbury, was a scholar and a zealous Protestant. In 1547 he pub. the first dictionary of English and Welsh, and executed the greater part of the first transl. of the New Test. into his native tongue (Lond. 1567). In 1588 appeared the earliest transl. of the whole Bible into Welsh.

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The author was Dr. William Morgan, afterward Bp. of St. Asaph. A revised ed., 1620, by Dr. Parry, Morgan's successor in St. Asaph, is the transl. still in use among the natives of the principality. Contemporary with Salesbury, but an adherent of the old faith, was Dr. Griffith Roberts, who lived on the continent and pub. at Milan a Welsh Grammar 1567. Another contemporary was Dr. John David Rhys, whose principal work, *Cambrobrytannicæ Cymræcæve Linguae Institutiones et Rudimenta*, is a treatise on Welsh grammar. In 1603 Capt. Myddleton, one of the first three persons who smoked tobacco in England, published a metrical version of the Psalms in Welsh, partly executed while cruising in the W. Indies. The most celebrated poets of the *third* period are: the Rev. Rees Prichard, vicar of Llandovery (1579-1644), whose *Canwyll y Cymry* (Candle of the Cambrians) is a metrical version of his professional homilies or sermons, the eloquence of which had previously won for him a great reputation as a preacher—it is still popular, the 20th ed. having appeared as late as 1858; Huw Morus, or Hugh Morris (1622-1709), author of a variety of pieces, which his countrymen consider unsurpassed in humor, pathos, and even sublimity—ed. in 2 vols. (Wrexham 1823), under the title *Eos Ceiriog* (The Nightingale of Ceiriog); and Goronwy Owen (1722—about 1780), a gifted bard, but an incurable drunkard, whose principal poems are in the first vol. of a book, *Diddanwch Teuluaid* (Domestic Amusement, Lond. 1763). Of the prose writers, the only noteworthy are Ellis Wynne (d. 1734), author of the *Bardd Cwsg* (Sleeping Bard, 1703), a series of visions of Hell and Hades, written with great beauty of style; and the Rev. Moses Williams (1685-1742), an antiquarian scholar of high merit, whose *Repertorium Poeticum*, or List of Welsh Poems and Catalogue of Welsh Books, is very valuable.

Fourth Period (1760 to present time).—Various causes gave new impetus to Welsh literature after the accession of George III. Among these, the most powerful were the establishment of periodical publications, the institution of patriotic societies, and the spread of Methodism. The first important production of this period is *Some Specimens of the Poetry of the Ancient Welsh Bards translated into English* (Lond. 1764), by Mr. Evans, curate of Llanvair Tal-y-haern, in Denbighshire. The next name deserving of mention is that of Owen Jones (1741-1814), who, though engaged in mercantile occupations all his life, managed, by enthusiasm and liberality, to quicken and extend the public interest in Welsh literature. In 1771 he founded the *Gwyneddigion* (society of the 'Men of Gwynedd'), which gave prizes for the best performances on the Welsh harp and the best Welsh poems: 1801-07 he caused to be published at his own expense, under editorship of Owen Pughe and Edward Williams, three vols. of the *Myvyrian Archaeology*, so called in honor of himself, who had assumed the bardic name Myvyr, from his native vale in Denbigh. Owen Jones was, however, rather a Welsh Mæcenæus than a Welsh *littérateur*. The next names of

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importance are those of the editors above mentioned, Owen Pughe and Edward Williams. The former (1759–1835), according to Southey, was a ‘muddy-minded man;’ nor is the fact that he was a follower of Joanna Southcott, and one of her 24 elders, adverse to this description of his intellect. Be this as it may, Owen Pughe is the great Welsh lexicographer; his dictionary of Welsh (1793–1803) contains 100,000 words, illustrated by 12,000 quotations. He also translated *Paradise Lost* into Welsh, in which work he threw off the chains of Welsh alliteration—an innovation generally acknowledged to be an improvement. Edward Williams (1745–1826), better known as Iolo Morganwg, is probably the finest Welsh genius of the fourth period: Southey knew him, and liked him greatly. His principal productions are *Salmau yr Eglwys yn yr Anialwch* (Psalms of the Church in the Desert); but an *Ode on the Mythology of the Ancient British Bards in the Manner of Taliesin* (1792), accompanied by notes and specimens of ‘Triads,’ containing the metaphysical and religious doctrines of the old Druidical bards, provoked a long-protracted controversy. Morganwg said that he had copied them from a MS. collection of a Welsh poet, *anno* 1560, which was in his possession, and affirmed that the collection was of very great antiquity. He was often asked to produce it, but always declined; and Welsh critics of the stricter sort have ceased to believe in its existence. The three associates in the publication of the *Myryrian Archæology* had each one son, and all of these have become eminent in connection with the literature of their native country. Taliesin Williams (1787–1847), son of Edward Williams, wrote poetry in Welsh and English; Aneurin Owen (1792–1851), son of Owen Pughe, among other works pub. an important collection of the *Laws of Wales*; and Owen Jones (d. 1874), son of Owen Jones the Welsh Mæcenas, had high reputation as an architect, the Alhambra at Sydenham being a favorable specimen of his professional talents. The fourth period of Welsh literature is naturally richer in critical than in creative works. Among Welsh antiquaries are: the Rev. Edward Davies (1756–1831), author of *Celtic Researches* (1804) and *Mythology of the Druids* (1809); the Rev. Thomas Price (1787–1848), author of the *Hanes Cymru a Chenedl y Cymry* (1836–42), a history of Wales and of the Welsh nation from the earliest times to the death of Llewelyn—an admirable work, comprehensive, critical, and literary (Price was an ardent and voluminous writer, contributing to 15 periodicals at the same time); and the Rev. John Williams ab Ithel, rector of Llanymowddwy, in Merioneth, and ed. of the *Cambrian Journal*. In 1856 he edited, for the Welsh MS. Soc., the *Grammar of Edeyrn, the Golden-tongued*, said to be composed about 1270; in 1860, the *Brut y Tydyrogon*, or Chronicle of the Princes; and in 1861 (*et seq.*) *The Traditionary Annals of the Cymry*, reprinted from the *Cambrian Journal*. Williams, though a rather credulous and uncritical writer, is a scholar of undoubted merit. Probably the ablest recent Welsh scholar was the late Thomas Stephens of Merthyr-Tydvil—patriotic and

honest, enthusiastic and critical: he, above all others, is to be consulted by those seeking some clear knowledge of Welsh literature. His principal works are *Studies on British Biography*, and *Literature of the Cymry in the Twelfth and following Centuries*. The enlightened views of Stephens have met with great acceptance among Eng. scholars in this department.

The poetry of the fourth period is not remarkable. The principal names are: David Richards of Dolgelly (1751-1827), author of a sort of epic on the unsuitable theme of the Trinity, and of a paraphrase of the history of Joseph; David Thomas of Caernarvon (1769-1822), very successful at the Eisteddfods; David Owen of Givion (1784-1841), whose poems were collected and published under the title *Blodau Arfon* (Flowers of Arvon); the Rev. Daniel Evans, a collection of whose pieces was pub. at Llandovery 1831, under the title *Gwinllan y Bardd* (The Poet's Vineyard); the Rev. Walter Davies (1761-1849), also great at Eisteddfods; the Rev. James Hughes (1779-1846); the Rev. William Rees of Liverpool, author of a spirited paraphrase of the Book of Job, etc.; and the Rev. William Williams of Caernarvon, author of *Grawn Awen* (The Treasure of the Muse), etc.

Passing by the mediocre Welsh prose written during this period on religious subjects, owing to the spread of Methodism among the Welsh, we glance at the history of Welsh periodicals and societies. The first Welsh periodical, ed. by the Rev. P. Williams and Evan Thomas, appeared about 1770, entitled *Yr Eurgrawn Cymraeg* (The Welsh Treasure); but the first that attained success was the *Seren Gomer* (Star of Gomer), pub. at Swansea (1814). In 1831 *Y Drysorfa* (The Treasury) was begun, under Calvinistic auspices; 1836, *Y Diwygiwr* (The Reformer) and *Y Dysgedydd* (The Teacher); 1833-41, *Y Gwladgarwr* (The Patriot), more a literary than a theological magazine; *Yr Haul* (The Sun), journal advocating the interests of the Established Church; and *Y Traethodydd* (The Essayist), begun at Denbigh (1845), distinctly the best literary organ in Wales. In 1879 more than 60 daily or weekly newspapers appeared in the principality; of these about a dozen were pub. in Welsh. There are about the same number of monthly or weekly magazines or periodicals, helping to keep alive the ancient speech; and two quarterlies in the Welsh language, on general subjects. There are also Welsh magazines conducted in English. The *Cambrian Register*, the *Cambro-Briton*, the *Cambrian Quarterly Magazine*, and the *Cambrian Journal*, dealt almost exclusively with Welsh subjects. A Welsh encyclopedia (*Encyclopædia Cambrensis—Y Gwyddoniadur Cymreig*) was begun under editorship of the Rev. John Parry of Bala, 1856. The *Archæologia Cambrensis*, the journal of the Cambrian Archæological Assoc., began to appear 1846. The *Enwogion Cymru* (1862) of the Rev. Robert Williams is a useful biographical dictionary of eminent Welshmen.

The leading Welsh societies, literary and antiquarian, that have existed or still exist, are the Cymmrodorion (Lon-

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don, 1751–81); a second Cymmrodorion (1820–43); the Soc. for Publication of Anc. Welsh MSS. (founded Abergavenny 1837); and the Cambrian Institute (founded 1853). The Eisteddfod, the annual national ‘sitting’ for the encouragement of bardism, music, and general literature, dates from the end of the 4th c.: its meeting lasts three or four days, a pres. and conductor are appointed for each day, and it is attended by thousands of persons of all classes. Prizes and medals are given for the best poetical, musical, and prose compositions, for the best choral and solo singing, and singing with the harp. On the last day the great event of ‘chairing’ the fortunate bard takes place.

WELSH ONION, or **CIBOL**, *sib'ol* (*Allium fistulosum*: see **ALLIUM**): perennial plant, native of Siberia; with fistular leaves and no bulb. Its leaves appear very early in spring, and are then used in soups and salads. Its flavor resembles that of garlic more than of the onion. It has long been cultivated in kitchen-gardens in Great Britain: the seed is sown in spring or summer; leaves fit for use are produced in the following spring, and the bed continues productive for years. The epithet *Welsh* is from the German *Wälsch*, and merely indicates a foreign origin.

WELSHPOOL, *wěłsh'pól* (often called **POOL**): municipal and parliamentary borough of N. Wales, county of Montgomery (of which it is considered the cap.); 18½ m. w.s.w. of Shrewsbury, 207 m. n.w. of London. Powis Castle is an ancient edifice, the oldest parts dating from the 12th c.; and the park is much admired. Woolen mills, tanneries, and malt-houses are in operation.—Pop. of municipal borough (1881) 7,107; (1891) 6,306.

WELT, n. *wělt* [*W. gwald*, a hem: Gael. *balt*, a border, welt of a shoe]: cord covered with cloth and sewed on seams or borders to strengthen them; a strip of leather sewed round the edge of the upper of a boot or shoe and the inner sole, and to which the outer sole is afterward secured; a selvage or edging; a low ridge or swelling on the surface of the skin, such as might be caused by a blow with a whip; a weal or wale: V. to sew, as a welt on a border or a shoe. **WELTING**, imp.: N. the act of sewing on a welt; the material used. **WELTED**, pp.

WELTER, v. *wěł'tér* [*AS. wealtan*; Dan. *vælte*; Low Ger. *weltern*; Ger. *wälzen*; Sw. *wältra*, to roll, to wallow]: to roll or wallow in something foul or liquid; to tumble up and down: N. a mess; a state of confusion. **WELTERING**, imp. **WELTERED**, pp. *-térđ*. **WELTER RACE**, or **WELTER STAKES** [corrupted from *swelter*]: a race in which the horses carry the heaviest weights.

WEN, n. *wěñ* [*AS. wenn*; Dut. *wen*; Low Ger. *ween*, a swelling, a wart]: a circumscribed, indolent, fleshy tumor in which there is no inflammation and no discoloration of the skin—affecting the face, head, or neck. **WEN'NY**, a. *-nŷ*, or **WEN'NISH**, a. *-nŷsh*, having the nature of a wen.—*Wens* consist of obstructed sebaceous glands, which enlarge by internal pressure of their accumulated secretions. The closed orifice may be often noticed in the form of a

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small dark point, and in that case the duct may sometimes be gradually enlarged by gentle introduction of a probe or director, and its contents pressed out. By this treatment they may, at all events, be kept from being unsightly, and will sometimes shrivel up and disappear. If this treatment fail, and the patient finds the tumor so annoying that he insists on its removal, it must be exterminated with caustic or the knife. In consequence of the dangers (especially erysipelas) that frequently attend cutting-operations of the scalp, the caustic treatment is generally preferable. The most prominent part of the wen must be thoroughly cauterized with nitric acid or potash, which will lead to the formation and separation of a slough: this will lay open the tumor, which may then be left to empty itself and wither, or may be emptied by pressure and cauterized within. As a general rule, wens are better left undisturbed, unless they can be emptied by simple pressure; as severe operations on them are frequently attended with danger.

WENCH, *n.* *wěncĥ* [OE. *wenche*, *wenchel*—from AS. *wencle*, a maid; *winclo*, children; *wencel*, weak—the original sense of *wenĥ* seems to have been 'infant': prov. Ger. *wankel*, tottering, unsteady]: a depreciatory or familiar term for a young woman; a woman of ill fame: *V.* to frequent the society of loose women. WENCH'ING, *imp.*: *N.* the habit of frequenting the company of loose women. WENCH'LESS, *a.* *-lēś*, having no loose women to associate with. WENCHED, *pp.* *wěncĥt*. WENCH'ER, *n.* *-ēr*, one who frequents the society of loose women.

WEND, *v.* *wënd* [AS. *wendan*, to turn, to go: Dan. *vende*; Icel. *venda*; Dut. and Ger. *wenden*, to turn]: to go; to pass on or along; to proceed on, generally used in phrase to *wend* one's way: *N.* in *OE.*, a large extent of ground; a circuit. WEND'ING, *imp.* WEND'ED, *pp.*

WENDS, *n. plu.* *wëndz* [from same root as *Vandal* (q.v.) and Eng. *wend*, *wander*]: roving or wandering tribes: name given by the Germans to a branch of the Slaves (q.v.) which, as early as the 6th c., occupied the n. and e. of Germany from the Elbe, along the coast of the Baltic, to the Vistula, and as far s. as Bohemia. They were divided into several tribes, which were successively subdued by the Germans, and either extirpated or gradually Germanized and absorbed, though scattered remnants of them are still found.—In a narrower sense, the name *W.* is given to those remnants of the Slavic population of Lusatia who still speak the Wendic tongue and preserve their peculiar manners and customs. They number about 150,000. A collection of Wendic songs was pub. by Haupt and Smaler (2 vols. Grimma 1843-4). WENDISH, *a.* *wënd'ish*, or WEND'IC, *a.* *-ik*, pert. to the Wends or their language. WEND'IC, *n.* *-ik*, the language.

WENER--WENLOCK GROUP.

WENER, *vā'nér*, **LAKE**: largest lake in the Scandinavian peninsula, and, after the lakes Ladoga and Onega in Russia, the largest in Europe; 150 m. w.s.w. of Stockholm, and about 30 m. inland from the Cattegat. It is more than 90 m. long, and 15 to 48 m. wide; 309 ft. in greatest depth, and 150 ft. above sea-level; 2,005 sq. m. From the n. shore a peninsula extends s. into the middle of the lake; and from the s. shore a peninsula extends n. to within about 15 m. of the point of the n. peninsula: the portion of the lake w. of these peninsulas receives the name Dalbo Lake. Of the numerous rivers that feed the lake the chief is the Klar, from the n., and its surplus waters are discharged into the Cattegat by the river Göta. Lake W. is connected by a canal with Lake Wetter, by means of which, the Göta canal, Lake Roxen, etc., inland communication is established between the Cattegat and the Baltic Sea. The lake is rich in fish; it is often visited by sudden gusts of wind, and is in many places too shallow for navigation.

WENLOCK, *wěn'lök*, or **MUCH WEN'LOCK**, *mŭch*: municipal borough in the county of Salop, England; 12 m. s.e. of Shrewsbury, about 163 m. n.w. of London. The principal buildings are the church, of considerable antiquity, bearing traces of Saxon and Norman architecture; and the town-hall, a venerable and interesting structure, decorated internally with elaborate oak carvings of the time of Charles II. There are also a savings bank and a public library and reading-room. The extensive ruins of W. Abbey afford a rich treat to antiquaries. The abbey was founded by St. Milberg, granddaughter of Penda, about 680, and was the parent church of Paisley Abbey, Scotland: it was destroyed by the Danes, and refounded by Leofric 1017. The town of W. proper, or Much Wenlock, is small (9,737 acres); but the municipal borough comprises 17 parishes (about 33,000 acres), including the market-towns of Madeley, Broseley, and Ironbridge, and the populous district of Coalbrookdale, where important iron and brick and tile works are carried on. There are extensive limestone quarries in the neighborhood. A railway connects W. with the Severn Valley railway at Buildwas; and another connects with the Shrewsbury and Hereford line.—Pop. (1881) urban sanitary dist. 2,321, municipal borough 18,442; (1891) 15,703.

WEN'LOCK GROUP: series of rocks of Upper Silurian age, which are largely developed in the neighborhood of Wenlock, England. The group is divided into an Upper and Lower series. The Upper, the Wenlock limestone, consists of a gray subcrystalline limestone, in some places 300 ft. thick, so hard that it has withstood the weathering which has removed the softer shales above and below it. In some places it contains huge concretionary masses of crystalline carbonate of lime, locally named 'ball-stones;' in other places it becomes thin and flaggy. It abounds in fossils, especially corals, crinoids, mollusca, trilobites. The Lower Wenlock series consists of 1,400 ft. of Wenlock shale and 150 ft. of Woolhope limestone and grit. The Wenlock shale is generally a dark gray, almost black,

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argillaceous rock, often containing elliptical concretions of impure earthy limestone. The Woolhope limestone and grit consists of gray argillaceous nodular limestones resting on fine shales. In Denbighshire it appears as a coarse grit, often of great thickness, and producing a very barren soil. The fossils are similar to those of the Upper series.

WENNISH, WENNY: see WEN.

WENT, *v. wënt*: an old imperfect and pp. of the verb *wend*, now used as the past tense of the verb *go*, though in origin *went* has no connection with *go*.

WENTLETRAP, *wěn'tl-trăp*: gasteropodous mollusk of the genus *Scalaria*, family *Turritellidæ*. The shell is spiral, with many whorls; whorls deeply divided, and not always close together, crossed by remarkably elevated ribs; aperture round and rather small. The animal is furnished with a proboscis, and has the eyes placed on an external convexity, the foot short and oval. About 100 species of the genus *Scalaria* are known. Those which have the whorls close together are called False Wentletraps by shell-collectors; those in which they are not contiguous are known as True Wentletraps. Of the former some are found in northern seas, as *Scalaria communis* on the coasts of Britain and of continental Europe, and *S. Grænlandica* on those of N. America. *S. Grænlandica* is abundant particularly on the banks of Newfoundland, and forms part of the food of the cod. The true Wentletraps all are natives of the seas of warm climates. Some are very beautiful. A species found in s.e. Asia, known as the PRECIOUS W. (*S. pretiosa*), was formerly in such esteem among shell-collectors that an extremely fine specimen is said to have been sold for more than \$1,000, and an ordinary price was from \$15 to \$25: it can now be bought at a low price. It is from an inch and a half to two inches long, snow-white or pale flesh-colored, with eight separated whorls.

WENTWORTH, BENNING: colonial governor of N. H.: 1696, July 24—1770, Oct. 14: b. Portsmouth, N. H.; son of Lieut. gov. John W. (1671–1730). He graduated at Harvard 1715, and became a merchant at Portsmouth, which he represented for a number of terms in the assembly. In 1734 he was appointed a king's councilor; and from 1741, when N. H. became a separate province, until 1767 was its gov. He was commissioned by the crown to issue grants of unoccupied lands, which he began doing 1749 in what is now s. Vt.: thus arose the famous 'N. H. grants' controversy between N. Y. and N. H., the colonial gov. of N. Y. claiming this land as a part of his territory, by virtue of the grant from Charles II. to the Duke of York. Gov. W., who had become wealthy through the excessive fees that he had received for these grants, lived in a style then deemed splendid at his spacious mansion in Portsmouth. He gave to Dartmouth College a large tract of land (500 acres), on a part of which the college buildings were erected. Bennington, Vt., was named in his honor. He died at Portsmouth.

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WENTWORTH, JOHN: jurist: 1719, Mar. 30—1781, May 17; b. Dover, N. H. He was a col. of N. H. militia; chairman of the revolutionary correspondence committee; pres. of the first N. H. revolutionary convention 1774; and state councilor 1776-81. From 1768-75 he was a member of the colonial legislature, and speaker 1771; judge of the court of common pleas 1773-76, and supreme-court judge 1776-81.

WENTWORTH, JOHN: lawyer: 1745, July 17—1787, Jan. 10; b. Somersworth, N. H.; son of John W. (1719-81). He graduated at Harvard 1768; studied law and was admitted to practice; was a member of the committee of safety during the revolution; a member of the colonial legislature 1776-80; delegate to the continental congress 1778-9; member of the state council 1780-84, and of the state senate 1784-87. He signed the Articles of Confederation for N. H. He died at Dover.

WENTWORTH, JOHN, LL.D.: journalist: 1815, Mar. 5—1888, Oct. 16; b. Sandwich, N. H.; grandson of John W. (1745-87). He graduated at Dartmouth 1836, settled in Ill. the same year, and soon began the study of law at Chicago, attending lectures at the Harvard Law School. While studying law he edited the *Chicago Democrat*; and subsequently purchased it and made it the leading newspaper of the northwest. From 1843-51 and 1853-55 he was a member of congress, elected as a democrat; 1857 and 1860, mayor of Chicago; 1861, member of the constitutional convention of Ill.; 1861-64 and 1868-72, member of the Chicago board of education; a republican member of congress 1865-67, having been one of the founders of the party. He wrote and lectured on the early history of Chicago (of whose citizens he was for many years one of the most eminent), contributed historical subjects to periodicals, and published an elaborate history of the Wentworth family. He died at Chicago.

WENTWORTH, Sir JOHN, LL.D.: 1737, Aug. 9—1820, Apr. 8; b. Portsmouth, N. H.; nephew of Benning W. He graduated at Harvard 1755, and began business with his father as a merchant. In 1765 he was sent to England to present petitions in behalf of his native province, and while there received the appointment of gov., to succeed his uncle Benning W., who had resigned 1767. He received also a commission as surveyor-gen. of the king's woods in N. America. He entered on his duties as gov. 1768, June. He was popular with the people, as he was efficient in efforts for the educational and material welfare of the province; but when the rupture between the crown and its colonies came, which he had endeavored to prevent, and he attempted to assist Gen. Gage to build his fortifications, it aroused the indignation of the revolutionary party, and W. was obliged to leave the country; and he sailed for England 1775. As gov. he gave Dartmouth College its charter; and he endowed it with 44,000 acres of land. He was gov. of Nova Scotia 1792-1808. He was made a baron 1795. He died at Halifax, N. S.

WENTWORTH—WEREGILD.

WENTWORTH, WILLIAM: colonist: 1615-1697, Mar. 16; b. Alford, Lincolnshire, England. In 1636, with the Rev. John Wheelwright, of whom he was a follower, he came to this country and settled in Mass.; 1639, Aug. 4, with Wheelwright and 33 others, he signed 'A Combination for a Government at Exeter, N. H.,' but five years later removed with him to Wells, Me., where Wheelwright had obtained a grant of land; subsequently he settled in Dover, N. H., and became a ruling elder in the church, and often preached. All the known Wentworths of this country are his descendants. He died at Dover.

WEPT, v. *wěpt*: pp. of **WEEP** (q.v.).

WERDAU, *věr'dow*: town of Saxony; on the river Pleisse; 40 m. s. of Leipzig (49 m. by railway). The people mostly are engaged in manufacturing cloth and in yarn-spinning. Pop. (1885) 14,638; (1900) 16,000.

WERDEN, *věr'dēn*: town of Rhenish Prussia; on the Ruhr; 17 m. n.e. of Düsseldorf. The people are employed in manufacture of cloth, linen, and silk, and in coal-mining. Pop. (1880) 7,590; (1890) 8,838; (1900) 9,600.

WERDEN, *wēr'dēn*. **REED**: naval officer: 1818, Feb. 28—1886, July 13, b. Delaware co., Penn. He entered the U. S. navy as midshipman 1834; was passed midshipman 1840; commissioned lieut. 1847; served on the sloop *Germanatown* during the Mexican war, and was in the expeditions to Tampico and Tuspan. In the first year of the civil war he was on the frigate *Minnesota* and had part in the attacks on the forts of Hatteras Inlet; commanded vessels of the n. Atlantic blockading squadron 1861-2, and led the first division in the taking of Roanoke Island; became commander 1862, July 16, and commanded the *Conemaugh*, of the s. Atlantic blockading squadron, 1862-3; was fleet capt. of the e. Gulf squadron 1864-5; with the steamer *Powhatan* blockaded the Confederate ram *Stonewall* at Havana 1865. He was commissioned capt. 1866, July 25; commodore 1871, Apr. 27; rear-admiral 1875, Feb. 4. He was commander-in-chief of the s. Pacific station 1875-6.

WERE, v. *wēr* [Icel. *vera*; Sw. *vara*, to remain, to be (see **WAS**)]: pt. plu. indic. and pt. subj. of the verb *be*. **WERT**, *wért*, second pers. sing. of pt. subj. *were*. As you **WERE**, in *military drill*, return to your former position.

WEREGILD, n. *wēr'gild*, or **WEREGELD**, or **WERGILD** [Lap. *warr*; Esthon. *werre*; Fin. *weri*, blood, and AS. *geld* or *gild*, a payment of money: less probably referred to AS. *wer*; L. *vir*, a man]: ancient commutation in money, by which, according to the custom of the Anglo-Saxons, Franks, and other Teutonic peoples, homicide and other heinous crimes against the person were expiated. There was an established progressive rate of W. for homicide, varying at different times and among different Teutonic tribes, from the W. of the *ceorl*, or peasant, to that of the king. In the time of Tacitus the W. for homicide among the Germans was due to the relatives of the deceased; that for other crimes, one-half to the injured party and one half to the state. The sum paid to the relatives in case of

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homicide, known also as the *man-wyrth*, seems to have been regarded as the equivalent of the dead man's value. As the power of the community or king increased, the exaction of retribution for the death of its members was considered to be the duty of the state as well as of the kindred, and the principle of division was applied to homicide as well as minor crimes; each payment being a separate full equivalent for the value of the deceased—one to appease the feud, the other to make atonement to the state. This double W. is recognized in the compensation for the death of a king by the laws of the Mercians and Northumbrians. In the days of Edward the Elder the W. had become a much more complicated penalty, the composition for homicide consisting of four different payments, two of which—the *fight-wite*, or penalty for a breach of the peace, and the *weregild*—went to the king as head of the state; while a sum called the *halsfang* was paid to the kindred to loosen the hand of the avenger of blood, and the *manbote* was given to the overlord to compensate him for the loss of a vassal. The graduated scales of W. in use among different Teutonic nations throw much light on the gradations of society at the period. It does not appear that, among the nations who recognized the principle of W., the relatives were bound to accept a compensation for their kinsman's slaughter, in place of appeasing the death-feud by blood; the latter practice was often resorted to instead. It was only through the exertions of Abp. Theodore that Egfred, the Christian king of the Angles of Northumbria, adopted the alternative of accepting a W. for his brother slain in battle by the Mercians, instead of demanding the blood of the slayer. A similar principle to that of W. for homicide seems to have been recognized by the Celtic nations, and there are traces of it in the Mosaic code.

WEREWOLF.

WEREWOLF, n. *wēr'wūlf*, or **WER'WOLF**, *wēr'-* [A.S. *wer*; Goth. *vair*; L. *vir*, a man, and *wolf*]: literally, 'man-wolf;' a man who (as is supposed), either periodically or for a time, is transformed or transforms himself into a wolf, becoming possessed of all the powers and appetites of a wolf in addition to his own, and being especially remarkable for his appetite for human flesh. (This definition includes only the commonest and best-marked incidents embraced in this belief.) The belief in the transformation of men into wolves or other beasts of prey has been very widely diffused; there are perhaps scarcely any ancient peoples among whom some trace of its former prevalence does not exist. It is not yet extinct, even in Europe. In many rural districts of France the *loup-garou* (the latter part of the word is a corruption of the Teutonic *werewolf*) is still an object of dread. This superstition lingers among the country-people of n. Europe, and a particular form of it flourishes among the Bulgarians, Slavonians, and Serbs, and even among the more intelligent inhabitants of Greece. Its details vary in different countries and districts. Manifestations suggestive of it may be occasionally observed in the mad houses of most countries: see **LYCANTHROPY**. The animal whose shape is taken is not always, though usually, a wolf; it was probably always the animal most frequently formidable, or considered most inimical to man. In Abyssinia it is the hyena.

Occasional notices of lycanthropy, as it is called, are found in classical writers: as there described, it was the change of a man or woman into a wolf, so as to enable the man or woman to gratify an appetite for human flesh, either by magical means, or through the judgment of the gods, as a punishment for some dire offense. Sometimes the transformation was into the shape of a dog or a bull. Ovid, in his *Metamorphoses*, tells the story of Lycaon, King of Arcadia, who, when entertaining Jupiter at a banquet, resolved to test his omniscience by serving up to him a hash of human flesh. The god, to punish him for this, transformed him into a wolf. Herodotus describes the Neuri as sorcerers who had the power of taking once a year, for several days, the shape of wolves; and the same account of them is given by Pomponius Mela. Pliny relates that, in Arcadia, every year, at the festival of Jupiter Lycæus, one of the family of Antæus was chosen by lot, and conducted to the brink of the Arcadian Lake, into which, after having hung his garments on a tree, he plunged, and was transformed into a wolf. Nine years afterward, if alive, he returned to his friends, looking nine years older than when he disappeared. Some notices of lycanthropy are found in Petronius; and allusion to it is made also by Virgil in the 8th *Eclogue*. Marcellus Sidetes tells of men who, every winter, were seized with the notion that they were dogs or wolves, and lived precisely like these animals, spending the night in lone cemeteries. This disorder attacked men chiefly in the beginning of the year, and was at its height usually in February. The classical instances of lycan-

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thropy refer mostly to Arcadia, a pastoral country, whose inhabitants suffered greatly from ravages by wolves.

In Norway and Iceland it was believed that there were men who were 'not of one skin:' such men could take other shapes than that of man, and the natures corresponding to the shapes which they assumed; they had the strength and other powers of the animal whose shape they bore, added to their own. It was believed that the change of shape might be effected in one of three ways: simply by putting on a skin of the animal; by the soul of the man deserting the human body—leaving it for a time in a cataleptic state—and entering into a body borrowed or created for the purpose; or, without any actual change of form, by means of a charm, which made all beholders see the man under the shape of the animal whose part he was sustaining. The two former were the common modes of transformation; at any rate, the sagas are full of illustrations of them, while illustrations of the third mode are comparatively rare. Nothing of the man remained unchanged except his eyes; by these only could he be recognized. Odin had, and freely exercised, the power of varying his shape. When men changed their shape to prey upon their kind, they always took the form of a wolf. It was believed that many had the power of thus transforming themselves; and great was the popular dread of werewolves. Perhaps the best stories of werewolves are in the northern sagas. Scarcely anywhere did the belief in them go so deep into the minds of the people as among the northern races. In connection, notice may be taken of the 'Berserkr rage,' which appears to have been a peculiar form of mania. The Berserkr yelled like dogs or wolves rushing into conflict, bit their shields with their teeth, and committed terrible atrocities while the paroxysms of their disease were upon them. Berserkr has been rendered 'bare-skinned;' others make it mean 'wolf-skin-coated' (why not 'bear-skin-coated?').

Olaus Magnus states that in Prussia, Lithuania, and Livonia, though wolves were very numerous and troublesome, the ravages of the werewolves were regarded as much more serious. Every year (as was believed) at the feast of the Nativity, at night, the werewolves assembled in great numbers at appointed places, and proceeded to look out for human beings, or tame animals, on which they could glut their appetites. If they found an isolated house, they entered it and devoured every human being and tame animal that it contained; after which—showing that they were not common wolves—they drank up all the beer or mead. Similar testimony with regard to Livonia is given by Bp. Majolus, who adds that the transformation into the wolf-form continued for 12 days.

Instances of persons changed into wolves by way of punishment were freely believed in the middle ages—e.g., St. Patrick was believed to have changed Vereticus, King of Wales, into a wolf; and there was an illustrious Irish family which had incurred the curse of St. Natalis, every member of which, male and female, according to the popu-

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lar belief, had to take the shape of a wolf, and live the life of a wolf for seven years.

In the 15th and 16th c. the belief in werewolves was, throughout the continent of Europe, as general as the belief in witches, which it had then come to resemble in many respects. It gave rise to prosecutions almost as frequent as those for Witchcraft (q.v.); and these usually ended in the confession of the accused, and his death by hanging and burning. It was of a nature to inspire even greater terror than witchcraft, since it was believed that the werewolves delighted in human flesh, and were constantly lying in wait for solitary travellers, and carrying off and eating little children. The werewolves, like the witches, were now regarded as servants of the devil, from whom they got the power—often exercised by anointing with a salve—of assuming the wolf's form; and it was believed that great numbers of them trooped together to the devil's Sabbath. The stories of mutilations and other misadventures befalling them in the wolf-state, by which, when they resumed the human form, they were identified as werewolves, exactly resemble the stories told of witches. In 1573, Sep., a court of parliament sitting at Dôle, in Franche-Comté, authorized the country-people to take their weapons and beat the woods for a werewolf, who had already—thus went the recital—‘carried off several little children, so that they had not since been heard of, and done injury to some horsemen; who kept him off only with great difficulty and danger to their persons.’ Throughout Europe the judicial cognizance of witchcraft and of lycanthropy ceased at the same time. In Great Britain, where wolves had early been exterminated, the werewolf was known only by rumors coming from abroad; but the belief that witches could transform themselves into cats and hares, which was prevalent, was precisely analogous to the later forms of the belief in werewolves.

The later forms of this strange belief were obviously sophisticated. In its earlier shape, three things are to be noticed—the power ascribed to the werewolf of transforming himself, either by changing the shape of his own body, or projecting his spirit into another body; his appetite for human flesh; his taking the shape and nature of the animal held to be most malicious against man—the wolf. As to the first of these, all that can here be done is to point to its connection with the doctrine of Transmigration (q.v.), and to add that it has been one of the commonest of human beliefs. As to the second, is it unlikely that, in the early times in which the superstition had its origin, the appetite for human flesh may have been frequent enough to spread terror through whole districts? Modern Europe affords unquestionable instances of this taste existing and being indulged in the midst of comparative civilization. There can be no doubt that some of the unhappy multitude put to death as werewolves had really murdered and eaten the flesh of human beings. But secret murders, unaccompanied by cannibalism, would tend to support a popular belief in cannibalism. We have not to go out of our own age

for proofs of the existence of men afflicted with a homicidal tendency; and in times when the means of detecting crimes were very imperfect, it is conceivable that the murders committed by one or two such persons would spread terror and give support to a superstitious theory throughout a large district. Maréchal de Retz, who lived in the middle of the 15th c., had caused to be stolen and put to death by torture many hundred children—he confessed on his trial that he had murdered 120 in a single year. (A memoir of Gilles de Laval, Maréchal de Retz, has been compiled from authentic documents by P. J. Lacroix, eminent French antiquary.) Perhaps no great community has been free from men similarly constituted, and acting similarly according to their opportunities. As to the third point, the taking of the wolf-shape, if it be granted that some practice of or general suspicion of cannibalism existed among a people who believed in the power of transformation, it is easy to understand how the cannibal, getting his victims by stealth, was supposed to indulge his inhuman appetite under the guise of the animal most unfriendly to man. And the existence of a form of mania in which the madman had the hallucination that he was changed into a wolf, yelled like a wolf, lived in many respects like a wolf, tended to confirm the belief in men-wolves: in conjunction with the mischief done by real wolves, this itself may be thought almost enough to have given origin to the superstition.—See *The Book of Were-wolves*, by Sabine Baring-Gould (Lond. 1865).

WERNER, *wér'nér*, Ger. *vér'nér*, ABRAHAM GOTTLÖB: German mineralogist and geologist: 1750, Sep. 25—1817, June 30; b. at Wehrau, on the Queiss, in Upper Lusatia. After studying at the Mineralogical Acad. of Freiberg, he went to Leipzig, where he studied nat. history and jurisprudence. Here, at the age of 24, he published his first work on mineralogy, a mere pamphlet on the external characters of minerals. In 1775, he was appointed prof. of mineralogy and curator of the Mineralogical Cabinet at Freiberg. In 1780 he published the first part of a transl. of Cronstedt's *Mineralogy*, in his notes to which he gave the first outlines of the system which bears his name. In 1791 he published *Theory of the Formation of Metallic Veins* (transl. into English and French), which greatly extended his reputation. In 1792 he was appointed counselor of mines in Saxony. He died at Dresden.

W.'s geological theories, formed in the infancy of the science, have long been left behind; but his influence was very great in promoting mineralogy and geology. His eloquent lectures gave the acad. at Freiberg a European reputation, and drew students from various countries. His theory (called sometimes the Neptunian theory) was the opposite of the Huttonian (or Plutonic) theory: it accounted for the present state of mineral substances in general by supposing them to have been dissolved or suspended in water; while the Huttonian theory ascribed almost everything to the action of fire. Modern geology recognizes a measure of truth in both; but rejects both alike in that

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character of universality in which they were formerly advocated. W. classified rocks into Primary, Transition, and Secondary; and the terms are still sometimes used, though merely as convenient names, not as indicative of opinions.

WERNERITE, n. *wér'nér-īt* [from *Werner*, a famous German mineralogist]: a mineral; a darkish-colored variety of scapolite.

WERNIGERODE, *vēr-nē-gā-rō'dēh*: small walled town of Magdeburg, in Prussian Saxony; 43 m. s.w. of the city of Magdeburg; at the n. base of the Brocken Mountain. Its castle, residence of the Counts Stolzberg-Wernigerode, contains a library of 40,000 vols. and has a zoological garden. W. manufactures linen, cloth, and tobacco; and carries on copper-smelting and paper-making.—Pop. (1885) 9,083.

WERSH, a. *wérsh*, or **WARSCH**, *wärsh* [origin uncertain]: in *Scot.*, not sufficiently salted; insipid; tasteless; poor in flavor or quality; of a pale or sickly appearance. **WERSH'NESS**, n. the quality of being wersh. **WERSH'LY**, ad.

WE'SAND: a variant of **WEASAND**.

WESEL, *vā'zél*: strongly fortified town of Westphalia, Prussia; on the Rhine; 32 m. n.n.w. of Düsseldorf. The Rhine, here joined by the Lippe, is divided by a fortified island, and crossed by a bridge of boats, protected on the left bank by a fort. Of its churches, the Willibrod Kirche was opened 1181, though in its present form dating from 1521. Cloth, hosiery, serge, leather, hats, tobacco, and linen are manufactured, and book-printing is carried on. The citadel is defended by about 4,500 men.—Pop. (1885) 20,677—more than half Rom. Catholics; (1890) 29,736.

WESER, *vā'zér* (L. *Visurgis*): river of Germany, formed out of the Werra, which rises in the Thüringerwald, and the Fulda, rising in the Rhöngebirge, on the frontiers of Prussia and Bavaria. These streams, after a northward course, unite at Münden, in Hanover, 380 ft. above sea-level; and the united stream, the W., flows n. through Prussia, till, passing Bremen, it forms for about 40 m. the boundary between Oldenburg and Prussia, and enters the North Sea by a wide but shallow estuary, much interrupted by sand. Entire length of the stream from the source of the Werra 439 m.; length of the W. below Münden 279 m., though in a straight line Münden is only 170 m. from the sea. The W. communicates with the Elbe by a navigable canal; but the navigation is not important. Its width at Münden is 330 ft., at Bremen 750 ft., at its mouth $7\frac{1}{2}$ m. The principal trading-town on its banks is Bremen.

WESLEY.

WESLEY, wěs'li, Eng. wěz'li, CHARLES: 1708, Dec. 18—1788, Mar. 29; b. Epworth, Lincolnshire, England; younger bro. of John W. He was associated with his brother in the whole Methodist movement. Having studied at Christ-Church, Oxford, and having been ordained priest, he visited Georgia with his brother; and was active in the subsequent work in England, seconding his brother with unceasing diligence, and by his hymns contributing greatly to the success of the movement. He was a clear and simple preacher and a man of fervent piety, but of a disposition far removed from asceticism, and without his brother's oratorical gifts and personal force. He wrote more than 6,000 hymns, of which 4,100 were published: they are largely in use among the Methodists; and many, in use among various denominations, are among the best and most admired hymns in the English language, replete with pious feeling, and of lyrical power and sweetness almost unsurpassed.—See his *Sermons* with Memoir (1816); *Life*, by the Rev. Thomas Jackson (1841); and *Journal*, with notes (1849).

WESLEY, JOHN: founder of the Methodists (see METH-ODISTS—British: METHODIST EPISCOPAL CHURCH: ETC.): 1703, June 17 (O. S.)—1791, Mar. 2; b. Epworth, Lincolnshire, England; second son of Samuel W. (1662–1735).—The family name, variously spelled Wesley and Westley, is supposed to be the same with Wellesley, and to be derived from Welswe, near Wells, in Somerset. An Irish gentleman, Garrett Wellesly, of Dungannon, offered to make Charles W., younger brother of John, his heir, on condition of his settling in Ireland—believing him to be of his own family. The offer was not accepted; and the estate of Garrett Wellesley went to another branch of the family, which was soon raised to the Irish peerage, with the title Earl of Mornington, and from which the Duke of Wellington (q.v.) and the Marquis of Wellesley (q.v.) sprang. The immediate progenitors of John W. were ministers of the Church of England, of Puritan principles. Some of them suffered for nonconformity. Bartholomew W., great-grandfather of John, was ejected from his living by the Act of Uniformity 1662. John W., bro. of Bartholomew, also was deprived of his living; and was often fined, and several times imprisoned, for preaching contrary to the law. His son Samuel W. (1662–1735) conformed to the Church of England—giving great offense to his family; but opposed the schemes of James II., refusing to be bribed by offers of preferment. He supported the cause of the Revolution, in circumstances of personal danger, and in the beginning of the reign of William and Mary was rewarded with the living of Epworth. He wrote an epic poem, *The Life of Christ*, and similar works. He had 19 children. His wife, Susannah Annesley, daughter of an ejected clergyman, was a woman of remarkable intelligence, great force of character, and fervent piety, who devoted herself to the education, particularly the religious education, of her children. His eldest son, Samuel W. (1690–1739) head-master of Tiverton School in

Devonshire, was a tory and high-churchman, who strongly disapproved of the 'new faith' and peculiar course of his brothers John and Charles.—John W., founder of Methodism, second son, or the second who grew to manhood, had in infancy a narrow escape from being burned to death, when the parsonage of Epworth was burned by some of the parishioners, enraged at their pastor's faithful reproof of their vices. Another remarkable story is connected with the parsonage of Epworth and with John W.'s early years—the continued disturbance of the family, for a considerable time, by loud knockings and other noises, which could not be accounted for, and which therefore were regarded as preternatural; though the annoyed household persisted in residing in the parsonage, even making sport of 'Old Jeffery,' their unseen visitant, who, on the theory of some writers, 'was plainly a Jacobite goblin, and seldom suffered Mr. Wesley to pray for the king and the Prince of Wales without disturbing the family prayers.' Adam Clarke, however, and other investigators invited by the family, declared the occurrences quite unaccountable.

John W. was a very diligent and successful student. The religious history of his college life belongs to the history of Methodism (see METHODISTS—British). After much conscientious hesitation as to his motives and fitness for entering into the clerical profession, he was ordained in the Church of England as deacon 1725; and in 1726 he graduated M.A., and was elected fellow of Lincoln College, Oxford. In the same year he was appointed Greek lecturer and moderator of the classes. He became curate to his father at Wroote, a small living which Samuel W. held with that of Epworth; and while serving here he was advanced to priest's orders 1728. He returned to Oxford, and with his younger brother Charles W. (q.v.) entered into those religious associations from which Methodism sprang. The intercourse of the brothers W. at this time with William Law, author of the *Serious Call*, had great influence on their opinions and conduct. They walked two or three times a year from Oxford to visit Law at his house near London. In 1735 John W. was induced to go to Georgia with Gen. Oglethorpe, to preach to the Indians and colonists. His religious views at this time were strongly tinged with asceticism. His intercourse with some Moravians, his fellow-passengers to America, afterward his fellow-laborers in the colony, tended to stimulate his religious zeal. He attempted to establish a discipline in the colony, very different from that of the Church of England at home; and failed in the attempt. The difficulties of his position were increased by an affair in which he became involved with the daughter of the chief magistrate of Savannah, whom he wished to marry; but on the advice of the Moravian bishop and elders, to whom he submitted the matter, he withdrew from her. She very soon married another, and W. refused her admission to the communion; on which her husband raised an action at law, and W., finding Savannah no suitable place for him, and, as he said, 'shaking the dust off his feet,'

returned to England, having resided in America not quite two years. With religious zeal undiminished, he maintained intimate connection with the Moravians in London. Several months after his return to England, he attended (1738, May 24) a meeting of a society in Aldersgate street, where, while one was reading Luther's preface to the Epistle to the Romans, he experienced such a change of religious feeling that, notwithstanding all his previous zeal, he ever afterward regarded this as the time of his conversion. 'I felt my heart strangely warmed,' he says; 'I felt I did trust in Christ, Christ alone, for salvation; and an assurance was given me that He had taken away *my* sins, even *mine*, and saved me from the law of sin and death.' Many who accept generally W.'s views of conversion doubt his opinion as to the date of his own. After this he visited the Moravian brethren at Herrnhut, in Germany, made the acquaintance of Count Zinzendorf, and was introduced to the prince royal of Prussia, afterward Frederick the Great. Returning to England, he became associated with his old college companion George Whitefield (q.v.); and after his example began, 1739, the practice of open-air preaching. From this time the history of W.'s life becomes very much the history of Methodism. In 1740 he solemnly separated himself from the Moravians, finding that he differed from them on important points of doctrine; and in the same year the doctrinal breach took place between Whitefield and him, which divided the Methodists into two sections, Calvinistic and Arminian. In the evangelistic work which he carried on in England, and in organizing the Methodist body, W. was indefatigable. He seldom travelled less than 40 miles a day, usually on horseback, till near the close of his life, when he used a chaise. In 1752 he married a widow with four children, but the marriage proved unhappy, and a separation ensued. His health gradually declined during the last three years of his life, and after a short illness he died in London, in the 88th year of his age. His remains lay in state for several days in his chapel in the City Road, dressed in the sacerdotal robes which he usually wore, with a Bible in his hand.—W. was a voluminous writer. His writings are chiefly polemical and religious. His style in the pulpit was fluent, clear, and argumentative, not impassioned like Whitefield's; his countenance was mild and grave; and his manners agreeable, though he exercised imperial domination over the preachers of the Methodist body. He was a man of great benevolence, and gave away all his living to the poor. Probably no man ever exerted so great an influence on the religious condition of the people of England as John W., and his influence, constantly increasing, has extended to the most remote parts of the world.—See *The Works of the Rev. John Wesley* (16 vols. Lond. 1809); *Life of the Rev. John Wesley, A.M.*, by Dr. Coke and Mr. Moore (Lond. 1792); *The Life of Wesley*, by Southey (2 vols. 1820; new ed. 1864); *The Life and Times of W.*, by Tyerman (1870); and *John W. and the Evangelical Reaction*, by Miss Wedgwood (1870).

WESLEY—WESLEYAN METHODIST.

WES'LEY, SAMUEL: musician: 1766, Feb. 24—1837, Oct. 11; b. Bristol, England; son of Charles W. (1708-88) (q.v.). At 3 years of age he played the organ; at 8 years composed *Ruth*, an oratorio. He was for a long time the most brilliant organist in England. He first introduced to English organists the works of Sebastian Bach, enforcing his appreciative judgment of the compositions by his own superb playing. He may be regarded as the father of the present English style of organ-playing. He left a great many MS. compositions.—His brother CHARLES W. (1757-1815), and his (Samuel's) son SAMUEL SEBASTIAN W. (1810-76), also were distinguished organists, more particularly Samuel Sebastian.

WESLEYAN, a. *wēs'li-an*: of or pertaining to the Wesleys, but specifically John Wesley (q.v.), or the sect founded by him: N. one of the sect called Methodists, established by John Wesley about 1739. **WES'LEYANISM**, n. *-izm*, doctrines and church government of the Wesleyan Methodists (see **METHODISTS**).

WESLEYAN FEMALE COLLEGE: educational institution of the Meth. Episc. Chh. South, at Macon, Ga. It was incorporated by the legislature, 1836, Dec. 23, as the Georgia Female College, and began its work 1839, Jan. 7, under trustees substantially the same as those of Emory College at Oxford, Ga. Its buildings cost \$85,000. Its first class of 11 received A.B. diplomas in 1840—a fact which places it among the earliest institutions giving college degrees to women. Financial difficulties soon befell it; and its land and buildings, bought for a small sum at sheriff's sale, 1843, Dec. 19, were given to the Georgia annual conference of the Meth. Episc. Chh. South, which continued it in operation under the same faculty and trustees—changing its name to that which it now bears. The main building, enlarged and beautified in 1881 by the gift of \$65,000 from George I. Seney, of Brooklyn, N. Y., is now one of the best in the south for educational purposes. Mr. Seney's total gifts to the college amounted to \$125,000. The curriculum comprises the usual collegiate studies. Much attention is given to music; and in art the various applications of drawing and painting are taught. Besides the regular A.B. course, there is a preparatory department, and a post-graduate or A.M. course of two years. The pres. (1901) is J. S. Hammond, D.D.; number of instructors 17; students 325; value of property \$280,000; volumes in library 5,000.

WESLEYAN METHODIST CONNECTION OF AMERICA, known commonly as the Wesleyan Methodist Church: religious body organized at Utica, N. Y., 1843, by ministers and laymen, mostly of the Meth. Episc. Church. Its origin was in the anti-slavery agitation of four or five previous years. The body adopted the articles of faith of the Meth. Episc. Church substantially; discarded episcopacy and presiding eldership from the plan of government, substituting a stationing committee whose appointments are subject to approval by the conference, and permitting

societies and churches to negotiate with any desired pastor, referring their choice and its acceptance to the stationing committee; and constituted the general and annual conferences of both ministers and lay delegates, with a representation also of local preachers. The rules of discipline adopted were stringent not only in respect to slave-holding, but also in forbidding the manufacturing, buying, selling, or using of intoxicating liquors, except for mechanical, chemical, or medicinal purposes, or in any way knowingly aiding others so to do; also in refusing to tolerate any ministers or members holding connection or fellowship with secret, oath-bound societies. Accordingly on more than one occasion, as in 1883, a delegate from the Meth. Episc. Church has been denied recognition on the ground that he was a member of a secret order.—The denomination was organized with 300 ministers and preachers, mostly local, and a membership of about 6,000. At the general conference of 1883 the assets of the publishing house at Syracuse, N. Y., including building, were \$49,975; two additional conferences were instituted; and it was resolved that the denomination was committed to the doctrine and work of holiness, in both justification and regeneration, and, subsequently to these, in entire sanctification. A resolution forbidding use of instrumental music in public worship failed of adoption; and one was passed forbidding division of any conference on account of color or nationality, in any case where all the pastors speak the same language. In 1887 resolutions were adopted against extravagance and vanity, especially in dress and furniture; and a vote in favor of the ordination of women was a tie, and lost.—The denomination seems to have been steadily growing. In 1881 there were 250 itinerant ministers and 200 local preachers, increased respectively in 1885 to 267 and 215. Membership reported 1902 was about 17,000, with 700 ministers, 516 churches and 22 conferences, all in the United States. The African mission resolved upon at the 12th quadrennial session, at La Otto, Ind., 1887, has resulted in two mission-posts—one in the interior; the other at Freetown, Sierra Leone, where there is a church and school building, together valued at \$30,000. The assets of the publishing house at Syracuse, N. Y., were valued (1891) at \$60,000, and the business is increasing. The organs of the denomination are the *Wesleyan Methodist* and the *Gospel Record*, both edited by the Rev. Arthur T. Jennings. There are two seminaries—one at Houghton, Allegany co., N. Y., which has a theological or Bible training dept.; and the other at Wasioja, Dodge co., Minn.

WESLEYAN UNIVERSITY: educational institution at Middletown, Conn., under the auspices of the Meth. Episc. Church. It is the oldest now in the care of that denomination, and originated in the gift of two buildings erected for a military academy 1825, the gift conditioned on raising \$40,000. The college was opened in the year of its charter, 1831, under the presidency of Wilbur Fisk, D.D., who continued until 1839. The students at first were classified and graduated according to attainments, without

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reference to the number of years passed in study. Now there are three courses of four years each—the classical, the Latin scientific, and the scientific. Since 1872 young women have been admitted to the classes, but the number has been comparatively small, the last report giving 57. Candidates can be admitted on certificate from certain high-grade preparatory schools. There are two grades of honors—the first requiring 88 per cent. proficiency, the second 83 per cent.; and the usual degrees in arts, philos., and science are conferred. There are (1901) 32 professors and 12 instructors. The report for 1901 numbers 12 graduate students and 338 in the undergraduate dept. The buildings, set in spacious grounds, front east, overlooking the Connecticut river, in a town noted for its beauty. In 1863 a gymnasium was built, but was replaced by one costing \$60,000, of which amount five-sixths was taken from Fayerweather bequest of \$150,000. In 1868 a library building was given by Isaac Rich, of Boston; it contains 61,000 vols., and has a fund yielding \$1,100 annually. In 1871 the memorial chapel, provided for by the alumni and other friends, was erected in honor of students who fell in the civil war. The same year Orange Judd erected the hall bearing his name, devoted to natural science, including biological and chemical laboratories, and museums which are especially rich in mineralogical and geological treasures (15,850 specimens) and large collections of shells (96,000), fishes (2,100), and other classes, with a herbarium of 10,700 species, in part the results of scientific expeditions from the university. Observatory Hall contains laboratories for physics and a Clark equatorial telescope of 12 in. aperture, with other instruments. The univ. was one of the first to provide scientific courses. In 1891 it instituted a well-provided department of electricity; and it is the seat of the Storrs Agri. Experiment Station, one of whose officers is the state chemist. Tuition is practically free by reason of scholarships, of which 48 were established by George I. Seney. Daniel Ayers, of Brooklyn, N. Y. (d. 1892, Jan.), was one of the largest benefactors, giving \$150,000 in 1890 for the biological department. The value of the grounds and buildings is \$650,000, endowment \$1,260,000, income \$96,552, gifts rec'd for the year 1900-01 \$75,000. The alumni elect 5 trustees; Meth. Episc. conferences in New England, N. Y., N. J., and Penn. 13; the rest are elected by the board. Bradford P. Raymond, D.D., LL.D., is the pres., succeeding Drs. Fisk, Bangs, Olin, Smith, Cummings, and Foss.

WESSEL, *vēs'sel*, JOHANN (WESSELUS, *vēs-sā'lūs*, GANSFORTIUS); called also *Gansfort*: one of the precursors of Luther and the Reformation: b. Gröningen, 1400 (or, according to some authorities, 1419 or 21); d. 1489, Oct. 4. He was probably the most renowned scholar of his day. He taught philosophy at Cologne, Louvain, Heidelberg, and Paris, and died in his native town. On account of his vast learning, he was called *Lux Mundi* (Light of the World); while his enemies, on account of his opposition

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to the scholastic philosophy termed him *Magister Contradictionum* (Master of Contradictions). His theology was developed from his deeply devotional mysticism. His tendencies toward a spiritual faith led him to take ground strongly anti-ecclesiastical: his dying utterance was, 'I know only Jesus the crucified.' He denied the infallibility of the pope, the authority of ecclesiastical tradition, and all magical efficacy in the sacraments. Luther highly esteemed W.'s writings; yet it cannot be shown, as has been asserted, that he forestalled Luther in his doctrine of justification by faith. After his death a large portion of his writings were burned as heretical. Another portion appeared under the title *Farrago Rerum Theologicarum*, of which Luther published an ed. with preface (Wittenb. 1522); but the most complete ed. is that by Joh. Lydius (Amst. 1617).—See Ullmann's *Joh. Wessel, ein Vorgänger Luther's* (1834); Bähring's *Das Leben Joh. Wessel's* (1846); and Friedrich's *Johann Wessel* (1862).

WESSELLS, *wēs'sēlz*, HENRY WALTON: soldier: 1809, Feb. 20—1889, Jan. 14; b. Litchfield, Conn. On graduating at West Point, 1833, he was assigned as 2d lieut. to the 2d U. S. infantry regt.; served in the Seminole war 1837-40, and in the mean time reached the grade of 1st lieut.; served in the Mexican war; was promoted capt. 1847; was brevetted maj. for gallant conduct at Churubusco, and received from the state of Conn. a sword of honor for 'distinguished services at Vera Cruz, Cerro Gordo, Contreras, and Churubusco.' He served with his regt. on the Pacific coast 1849-54, and on the n.w. frontier 1855-61, taking part in the Sioux expedition 1855; was commissioned maj. 1861, and was for a time col. of a Kansas regt. Transferred to a command in the Army of the Potomac, he served through the Peninsular campaign and was wounded at Fair Oaks. Afterward he was engaged in the operations in N. C. After a gallant resistance of 4 days, at Plymouth, N. C., he with his garrison of 1,600 men surrendered to Gen. Robert F. Hoke, who had invested the place with an army of 7,000 men. W. was held prisoner by the Confederates, and was one of the Federal officers exposed on Morris Island, Charleston Harbor, to the fire of the Federal batteries. After the war he held a command in the n.w. till his retirement 1871. He died 1889, Jan. 14. His son HENRY W., was lieut.-col. in the 3d U. S. cavalry. W.'s brother LEVERETT WARD W. was col. of a Conn. regt. in the civil war, and afterward held civil office in Conn.

WESSON, *wēs'sōn*: town, Copiah co., s.w. Miss.; on Ill. Central r.r. W. has several banks, telegraph and telephone communications, and express service. The chief industry is the manufacture of cotton and woolen goods; the local factory employs nearly 2,000 persons. Agricultural pursuits are followed and a weekly newspaper is published. W. is popular as a summer resort.—Pop. (1890) 3,198; (1900) 3,279.

WESSEX: see HEPTARCHY.

WEST.

WEST, n. *wěst* [Dut. *west*, west: Dan. and Sw. *vest*; Icel. *vestr*, the west: AS. and Ger. *west*, west]: strictly, the quarter of the heavens where the sun sets at the equinox; one of the four chief points of the compass; a country or district lying in the direction of the setting sun: V. in *OE.*, to pass or change to the west; to set, as the sun: ADJ. situated toward or coming from the part where the sun sets: AD. to the western regions; more westward. **WEST'ERING**, a. in *OE.*, passing to the west. **WEST'ERLY**, a. *-ēr-lǝ*, lying or being toward the setting sun; coming from the west or a point near it: AD. tending or passing toward the west. **WEST'ERN**, a. *-érn*, of or pertaining to the west; lying or looking toward the west; dwelling in the direction toward the west; going to the west; coming from the west. **WEST'ERNER**, n. *-ēr*, one who lives in a western country or district. **WEST'ING**, n the distance, expressed in nautical miles, which a ship makes good in a west direction; departure westward. **WEST'ERNMOST**, or **WEST'MOST**, a. *-mōst*, farthest to the west. **WEST'WARD**, ad. *-wérd*, toward the west; in a direction toward the west; also **WEST'WARDLY**, ad. *-lǝ*, and **WEST'WARDS**, ad. *-wérdz*.

WEST, BENJAMIN: Anglo-American painter: 1738, Oct. 10—1820, Mar. 11; b. Springfield, Penn.; of Quaker parentage. With lack of opportunity or encouragement, he surprised his friends by his skill in drawing at the age of 7 years, and at 9 painted a picture in water-colors which in some points, he declared in after-life, he had never surpassed. His first colors were made from leaves, berries, etc., and his brushes stolen from a cat's tail. Thus self-taught, at the age of 16 he practiced portrait-painting in the villages near Philadelphia, and painted for a gunsmith his first historical picture, *The Death of Socrates*. While the Society of Friends were discussing the propriety of his becoming a painter, he shocked their principles still more by volunteering in a military expedition to search for the remains of Braddock's army. At the age of 18 he was painting portraits in Philadelphia, and later at New York, where, 1760, he was aided by some generous merchants to go to Italy for study. At Rome he was patronized by Lord Grantham, whose portrait he painted; became the friend of Mengs; and, as the first American

WEST.

artist ever seen in Italy, attracted much attention. He painted his *Cimon and Iphigenia*, and *Angelica and Medora*, and was elected member of the Academies of Florence, Bologna, and Parma. In 1763, visiting England on his way to America, he was induced to remain in London, where he settled as a historical painter. In 1765 he married Eliza Shewell, to whom he had been engaged before leaving America. His *Agrippina Landing with the Ashes of Germanicus* attracted the attention of George III., who was his steady friend and patron for 40 years, during which time W. sketched or painted 400 pictures. His *Death of General Wolfe*, painted in the costume of the period, against the advice of all the most distinguished painters, effected a revolution in historic art. For the king he painted a series of 28 religious pictures for Windsor Castle. His best-known works are *Christ healing the Sick* (purchased by the Brit. govt. for 3,000 guineas), *Death on the Pale Horse*, and the *Battle of La Hague*. In 1792 he succeeded Sir Joshua Reynolds as pres. of the Royal Acad., but declined the honor of knighthood. Through his whole career he was the generous friend, adviser, and patron of young artists. *The Life and Studies of Benjamin West* were compiled from materials furnished by himself, by John Galt, in two parts (Lond. 1816-20); and a biography of him is in Cunningham's *Lives of Eminent British Painters*. He died in London, and was buried with great pomp at St. Paul's Cathedral.—W.'s reputation as an artist has not held its original height: critics of the present day find his work lacking in that freedom which indicates genius, and evincing a lack of spirited conception.

WEST, JOSEPH RODMAN: U. S. senator: b. New Orleans, La., 1822, Sep. 19. He studied at the Univ. of Penn., but did not graduate; served as capt. of vols. in the Mexican war; settled in Cal. 1849, in commercial occupations. At the beginning of the civil war he entered the Union army as lieut.col. of 1st Cal. infantry; served in New Mex. and the southwest; 1862, Oct. 25, appointed brig.gen. of vols., and subsequently brevetted maj.gen. of vols.; mustered out of service 1866, Jan. 4; settled for a time in Texas, then removed to New Orleans; held successively several offices under the U. S. govt. In 1871-77 he was U. S. senator.

WEST, NATHANIEL, D.D.: clergyman: 1794-1864, Sep. 2; b. Ulster, Ireland. He studied theology at Edinburgh, Scotland, and was ordained 1820. In 1834 he came to this country and held various pastoral charges in Presb. churches—the last at Philadelphia. From 1862 till his death he was chaplain of the Satterlee U. S. General Hospital at w. Philadelphia. Among his published works are *The Ark of God the Safety of the Nation*, and *Babylon the Great*; but he is remembered chiefly for his laborious and useful compilation, *A Complete Analysis of the Holy Bible*.

WEST BAY CITY: city in Bay co., Mich.; on the Saginaw river, and on the Battle Creek and Bay City, the Cincinnati Saginaw and Mackinaw, and the Michigan Central railroads; opposite Bay City, 13 m. n. of East Sagi-

WESTBOROUGH—WEST CHESTER.

naw. It comprises the former villages of Winona, Banks, and Salzburg; contains 5 churches, state normal school, 2 state banks (cap. \$100,000), and 1 daily and 1 monthly periodical; and exports large quantities of lumber.—Pop. (1880) 6,397; (1890) 12,981; (1900) 13,119.

WESTBOROUGH, *wĕst'bŭr-rō*: town in Worcester co., Mass.; on the Boston and Albany railroad; 12 m. e. of Worcester, 32 m. w.-by-s. of Boston. Its manufactures are boots and shoes, straw goods, spring-beds, and sleighs; and contains 2 banks, 7 churches, high school, Willow Park Seminary, State Reform School, a water-cure establishment, 2 weekly newspapers.—Pop. (1890) 5,229; (1900) 5,400.

WEST BROMWICH, *brŭm'ij*: municipal and parliamentary borough in Staffordshire, England; near the river Tame; 6 m. n.w. of Birmingham, 133 n.n.w. of London; one of the most important towns in the great manufacturing and mining district known as 'The Black Country,' though a few years ago it was a mere village on a barren heath. W. B. owes the rapidity of its growth to the rich mines of coal and iron in the vicinity, and to the industries to which these give rise. There are numerous churches, schools, and other important establishments. There are very large glass-works and also gas-works in the town; much of the gas used in Birmingham, as well as all that supplied to W. B., Wednesbury, and many other towns in the vicinity, being made here. The manufactures of hardware of all kinds are very extensive. W. B. was incorporated 1882.—Pop. (1891) 59,489; (1901) 65,172.

WESTBROOK: city in Cumberland co., Me., on Presumpscot and Stroudwater rivers, 6 m. n.w. of Portland, on the Boston and Maine and the Maine Central railroads. It contains the villages of Saccarrappa and Cumberland Mills. The city charter was adopted 1891. The city has several churches, public schools, a bank, and abundant water-power, sustaining manufactures of belting, boots and shoes, paper, silk, and cloth goods, etc.—Pop. (1880) 3,981; (1890) 6,632; (1900) 7,283.

WESTBURY, *wĕst'bĕr-ĭ*: borough of Wiltshire, England; 20 m. n.w. of Salisbury; on the w. declivity of Salisbury Plain. Its church—the older parts at least—was erected in the 13th c. W. is in a region interesting from its many antiquities. The inhabitants are employed chiefly in agriculture, the manufacture of woollen cloth of a superior quality, and the smelting of iron ore, extensive mines of which are near the town.—Pop. (1891) 6,583.

WEST CHES'TER: borough, cap. of Chester co., Penn.; on the Pennsylvania and the Philadelphia Wilmington and Baltimore railroads; 26 m. w. of Philadelphia. It is in a highly cultivated agricultural region; contains 17 churches, state normal school, horticultural hall, public library, court-house in the form of a Greek temple, 8 hotels, 2 green serpentine stone quarries, and 3 daily and 5 weekly newspapers; and manufactures foundry products, machinery, flour, hosiery, soap, and candles. W. C. was created co. town 1788, borough 1789.—Pop. (1880) 7,046; (1890) 8,028; (1900) 9,524.

WESTCOTT—WESTERN AUSTRALIA.

WESTCOTT, *wĕst'kŏt*, BROOKE FOSS, D.D., D.C.L.: bp. of Durham, Eng.: b. near Birmingham, 1825, Jan. 12. He was educated at Trinity College, Cambridge; was ordained deacon and priest in the Church of England 1851; was asst. master at Harrow 1852-69, examining chaplain to the bp. of Peterborough 1868-83, canon residentiary at Peterborough Cathedral 1869-83, honorary chaplain to the queen 1875-79, select preacher at Oxford 1877-80. He was appointed regius prof. of divinity at Cambridge in 1870, chaplain in ordinary to the queen in 1879, examining chaplain to the abp. of Canterbury 1883, canon of Westminster 1884-90 and afterward became bp. of Durham. W. was a member of the New Test. revision committee; has published many doctrinal and historical works; and received the degree D.D. from Cambridge 1870 and Edinburgh 1883, and D.C.L. from Oxford 1881. The New Test. in a critically revised Greek text, edited by W. and Prof. Hort (1881), is recognized by scholars as a work of high rank. He died 1901, July 28.

WESTERLY, *wĕs'tĕr-lĭ*: town in Washington co., R. I.; on the Pawtucket river (vill. on both sides of the river), and on the New York Providence and Boston railroad; 5 m. from Long Island Sound, 6 m. n.e. of Stonington. The river is navigable to W. for small vessels. W. is engaged in manufacture of cotton and woolen goods; but is best known for its quarries of excellent granite, with which some of the handsomest structures in New Haven, Hartford, Providence, and other cities were built. There are gas and electric light plants, 10 churches, public library, high and graded schools, 2 nat. banks (cap. \$400,000), 3 savings banks, 1 branch bank, and 1 daily, 1 weekly, 1 monthly publications.—Pop. (1890) 6,813; (1900) 7,541.

WESTERN AUSTRALIA: British colony, forming the section (more than one-third) of Australia w. of the 129th meridian; extreme length, n.e. to s.w., 1,400 m.; average breadth 850 m.; 1,060,000 sq. m. This colony was formed 1829, and was formerly named *Swan River Settlement*, from the river Swan, which joins the Indian Ocean after watering a considerable district in the extreme s.w. Of the whole vast area, this district in the s.w. is still the only portion inhabited. There mountain ranges rising from the coast inland run parallel with each other from s. to n., the highest summit being 5,000 ft. above sea-level. The climate is agreeable and salubrious; the soil, on the coast and in the interior, is light and dry. Bands of fertile land, where the sandal-wood and other trees grow abundantly, and which are suitable for the culture of the vine, olive, and fig, occur in the middle districts. Rivers, of which the Swan is the chief, abound; but are of little use for navigation. They include the Murray, the Murchison (400 m.), the Gascoigne (200 m.), the Moore, the Greenough, Ashburton, Fortescue, De Grey, Fitzroy, Ord, etc. Magnetic iron ore, lead, copper, and zinc ores are found in large quantities, and a little coal. Gold also has been found in Kimberley, about 250 m. s. of Cambridge Gulf, along the courses of the rivers Margaret,

WESTERN CHURCH—WESTERN RESERVE.

Mary, and Elvira, tributaries of the Fitzroy and Ord. W. A. is a crown colony, having a gov. named by the crown, and a legislative council partly nominated and partly elected. It is divided into 5 districts—the Central (the settled district, divided into 26 counties), Central Eastern, Eastern, North, and Kimberley: cap. Perth (pop. 7,000).—The colony became (1849), at the request of the colonists, a settlement for convicts, and has much benefited by their labor, a great extent of road and many public buildings having been constructed by them. In 1868, however, the system of transportation to W. A. was discontinued. Though W. A. has a coast-line of 3,500 m., it has few safe harbors. In 1893 the revenue aggregated \$2,853,255; expenditures, \$3,204,005; total value of imports, \$7,472,190; value of exports, \$4,590,735. The principal exports were: wool, \$1,224,860; pearls and shells, \$446,270; skins, \$119,875; timber, \$164,440; gold, \$2,106,925; sandalwood, \$160,800. Gold-mining is rapidly becoming one of the most important industries. The agricultural prosperity of the colony has recently greatly increased. The climate of W. A. is excessively dry, and few places have a rainfall of 40 inches, even in settled districts.—Pop. (1891) 49,782; (1901) 184,124.

WESTERN CHURCH: in *chh. hist.*, the Latin as distinguished from the Greek Church; the Roman Church.

WESTERN EMPIRE, THE: portion of the Roman empire, consisting of Italy, Illyricum, Spain, Gaul, Britain, and Africa, which Valentinian I. (q.v.) reserved for himself when in 364 he shared the imperial authority with his brother Valens (q.v.), who reigned in Constantinople as emperor of the East, and whose territories comprised the e. half of the Balkan peninsula, Greece, Egypt, Syria, and Asia Minor, as far as Persia. This partition of the Roman empire became final 395, when Theodosius the Great divided the Roman world between his two sons—Honorius, who became emperor of Rome and the West, and Arcadius, who became emperor of Constantinople and the East. The W. E. terminated 476; the Eastern Empire 1453. See **ROME**—*The Roman Empire*: **BYZANTINE EMPIRE**.

WESTERN RESERVE, THE: part of the tract of land in the old terr. of O., n. of lat. 41° n., claimed by Conn., as having been ceded to it by Charles II. 1662. The land s. of that line was claimed by Va., as having been ceded to it by James I. 1611. Mass. and N. Y. also laid claim to large tracts in the terr., in the valleys of the Ohio and Mississippi, that had been claimed by the French by right of discovery or exploration. All the terr. held or claimed by France was ceded to Great Britain by the treaty of Paris (1763). The claims of the above states were made after the revolutionary war, and each claimant ceded the right of eminent domain to the federal govt. 1800; but Conn. and Va. reserved the ownership of about 3,700,000 acres each—the Va. reserve comprising the part now included in the state of Ind.; and the Conn. reserve comprising lands in O., between Lake Erie and 41° n. lat., known as the W. R. It was settled largely from Conn.; and was

WESTERN RESERVE UNIVERSITY.

long known as a region of much thrift, and of moral public sentiment, which made the W. R. the early home of the anti-slavery and other reforms.—See CONNECTICUT—*History*: INDIANA—*History*: OHIO—*History*.

WESTERN RESERVE UNIVERSITY: institution of learning founded 1882 in Cleveland, O., being a consolidation of a number of institutions. The university consists of 7 depts.: the parent institution, now ADELBERT COLLEGE, was founded 1826 as Western Reserve College at Hudson, O., and was transferred to Cleveland, 1882, receiving large benefactions from Amasa Stone. It had (1895) 21 professors and instructors. The preparatory section of this dept. remains at Hudson, under the name Western Reserve Academy. The degrees of Adelbert are Bachelor of Arts and Master of Arts.—The COLLEGE FOR WOMEN was opened 1888, sharing in the rights of the original foundation. It has the advantages of separate education, since its students are free from constant association with youngmen in class-rooms and lecture-halls; it has the advantages of co-education, since its proximity to Adelbert Coll. necessitates a common standard. The policy is that each college, having a full faculty, is to receive the benefit of the instruction and of association with the professors of the other. The method is not the annex system, as the degrees are conferred by the university of which the college is an integral part. While not denominational, the college is in every aim and purpose Christian. It had (1895) 24 professors and instructors. The degrees are Bachelor of Arts, Bachelor of Letters, and Bachelor of Philosophy.—The privileges of the GRADUATE DEPARTMENT are open, without distinction of sex, to graduates of this and other universities and colleges of good standing, who present satisfactory evidence of character and scholarship. In exceptional cases and by special permission other persons of suitable age and attainments may be received as students. The library facilities are exceptionally good. The degrees conferred are Master of Arts and Doctor of Philosophy. The latter degree is conferred only on persons who have previously received a bachelor's degree either from this or from some other university or college. The degree is not given merely for study of courses or text-books assigned, but as evidence of special ability in some chosen field. It had (1895) 25 professors and instructors.—In the MEDICAL COLLEGE the full course is four years of eight months each year. This course is graded by an examination to enter and by examinations to advance from year to year. No student is permitted to enter on the course of a given year unless he has shown by examination that he is prepared for the studies embraced in that year. The COLLEGE OF DENTISTRY had 9 instructors. The COLLEGE OF LAW had 10 instructors and the support of the Cleveland bar. Examinations on enumerated subjects are not technical and minute, but are intended to ascertain whether the candidate has pursued the subjects intelligently, and whether he is capable of profiting by a course of thorough instruction in law. Graduates of law-schools that have a course covering two years of 36 weeks each are admitted to the third-year class without

WESTFIELD—WESTMACOTT.

examination.—The total number of professors and instructors in W. R. U. 1902 was 175; students in the collegiate dept. 240, in the graduate dept. 13, in the professional depts. 109—total 800; library, 45,000 volumes. Productive funds (1902) \$1,300,000; total income \$251,000. The pres. is Charles F. Thwing, D.D.

WESTFIELD: town in Hampden co., Mass.; on the Westfield river, and on the Boston and Albany and the New York New Haven and Hartford railroads; 10 m. w. of Springfield. It contains a state normal school, high school, 2 grammar schools, Westfield Athenæum, with public library and reading-room, 10 churches, 2 national banks (cap. \$400,000), 2 savings banks, and 2 weekly newspapers. W. has a new system of water-works that cost \$250,000; and among its numerous industries are manufactories of church organs, cigars, whips, paper, steam-heaters, and various machinery.—Pop. (1880) 7,587; (1890) 9,805; (1900) 12,310.

WEST INDIES: see **ANTILLES**; also: **JAMAICA**: **CUBA**: **MARTINIQUE**: **BARBADOES**: **TRINIDAD**: ETC.

WESTINGHOUSE, *wěst'ing-hows*, **GEORGE**: inventor: b. Schenectady, N. Y., about 1846. He showed a genius for invention at an early age; spent some years in the large agricultural works of his father; entered the army when 17 years old, but was soon transferred to the navy, where he served till the close of the war. He established himself in Pittsburgh 1868, and organized a company for manufacturing the air-brake bearing his name, and used on nearly all the railroads in the United States and Europe, 1869. He has since organized 11 other companies for mfg. electric light apparatus, machinery, underground cable apparatus, railroad switch and signal plants, and other mechanical appliances of large public importance—all based on his own inventions.

WESTLAND, *wěst'land*: provincial district of New Zealand, formerly part of Canterbury; occupying the w. portion of the southern island. It is 300 m. long by 30 broad.—Pop. (1891) 15,882; (1901) 14,506.

The chief town is Hokitika, pop. 3,500.

WEST LOTHIAN: see **LINLITHGOW**.

WESTMACOTT, *wěst'ma-kot*, **RICHARD**, R.A.: English sculptor: 1799-1872; b. London; son of Sir Richard W. After being carefully educated in art by his father, he was sent to Rome 1820 for further study. After 6 years in Italy he returned to London, where he gradually won reputation both as sculptor and as a man of literary attainment; and 1837 he was elected a fellow of the Royal Soc. On the death of his father, he succeeded him as prof. of sculpture.

WESTMACOTT, *wěst'ma-kot*, **SIR RICHARD**, R.A., D.C.L.: English sculptor: 1775-1856, Sep. 1; b. London; son of Richard W., also a sculptor of some note. His predilection for art was early manifested. He received the best education which London could then furnish, and 1793 went to Rome to complete his studies. Here he became in some

WESTMEATH—WEST MERIDEN.

sort a pupil of the celebrated Canova, who showed him much kindness. His progress was rapid, and he distinguished himself by gaining the highest prizes, in particular a gold medal given by the pope. Having been elected a member of the Acad. of Florence, he returned to London 1797, where, shortly afterward, he married. Very soon he found himself in full employment. In 1805 he was elected an associate of the Royal Acad.; in 1816 he was advanced to the full dignity of academician; and 1835 the Univ. of Oxford gave him the degree D.C.L. Two years later he was knighted. In 1827 he had succeeded Flaxman as prof. of sculpture at the Acad., in which capacity he continued till his death. The works by which chiefly W. is known are public monumental statues, such as his statues in Westminster Abbey of Pitt, Fox, Perceval, and Addison, with the monuments to Sir Ralph Abercromby and Lord Collingwood in St. Paul's Cathedral. Many of his works in the antique classical manner also are of exquisite beauty and finish.

WESTMEATH, *wěst'mēth*: inland county of Ireland, prov. of Leinster; having Meath on the e., Roscommon on the w., Cavan on the n., and King's co. on the s.; greatest length, e. to w., about 40 m.; greatest breadth, n. to s., about 35 m.; 708 sq. m., or 453,468 acres, of which 111,752 are under tillage. The surface is generally level, the hilly district, in the n., not reaching higher elevation than 710 ft. Still, from the number of lakes, and the extent of wood in some districts, the scenery is in many places picturesque. Geologically, W. belongs to the great central limestone series; yellow sandstone occurring in only two very limited districts. Of the numerous lakes, one chain belongs to the basin of the Shannon, which forms the w. boundary and separates W. from Roscommon; the other, toward the e., flows into the basin of the Boyne. The Shannon is navigable for steamboats throughout its course bounding this county; and inland navigation is further provided by the Royal canal, which traverses W. from e. to w., and by a branch of the Grand canal. The county is traversed by the Midland and Great Western railway. The climate is mild and not very moist. The soil is a deep loam, producing herbage suited especially for fattening cattle. There is little tillage; scarcely a fourth part of the county being under crops (chiefly oats), much of the area being lake and bog. In addition to weekly markets, more than 70 fairs are held at different seasons. W. is divided into 12 baronies, and contains 63 parishes and 1,356 townlands. The chief towns are the assize town and cap., Mullingar (q.v.), Moate, and Athlone, which is partly in the county of Roscommon.—W. anciently formed a portion of the kingdom of Meath (q.v.), but 1543 it was erected into a separate county, and at first included Longford (q.v.) and part of the King's County (q.v.). Many antiquities of the Anglo-Norman period, and some of the Celtic, chiefly tumuli and raths, are found in this interesting county.—Pop. (1901) 61,629, mostly Rom. Cath.

WEST MERIDEN: see **MERIDEN**.

WESTMINSTER.

WESTMINSTER, *wĕst'mĭn-stĕr*, THE CITY AND LIBERTY OF: part of London (q.v.), the metropolis of the United Kingdom; bounded e. by Temple Bar, s. by the Thames, w. by Chelsea and Kensington, n. by Marylebone. The early history of W. is that of the abbey, still the most interesting of its public buildings. In early times that part of W. which adjoins the Thames was surrounded by a branch of the river, forming an island called Thorney Island, from being covered with brush-wood. Here, on the site of the present abbey, Sebert, King of the East Saxons, is said to have built a church, 7th c. It is supposed to have been replaced by an abbey called Westminster, to distinguish it from the cathedral church of St. Paul's, originally called Eastminster. The first edifice on the site, of which we have any certain account, was built of stone by Edward the Confessor, 1065. The Pyx House, a low apartment, 110 ft. long by 30 ft. wide, vaulted and divided by a central range of eight plain pillars with simple capitals, is nearly all that remains of it. The principal parts of the existing abbey were built by Henry III. In 1220 he erected a chapel dedicated to the Virgin, and later took down the old abbey of the Confessor, and erected the existing choir and transepts, and the Chapel of Edward the Confessor. The rest of the building was completed under the abbots, the w. parts of the nave and aisles 1340-1483. The w. front and its great window were the work of Richard III. and Henry VII. The latter pulled down the chapel to the Virgin, erected by Henry III. at the e. end of the church, and built the chapel known as Henry VII.'s Chapel. This completed the interior of the abbey as it now stands; the only important addition since having been the upper parts of the two w. towers, the work of Sir Christopher Wren. The whole building forms a cross. Its extreme length, including Henry VII.'s Chapel, is 511 ft.; width across the transepts 203 ft. The width of the nave and aisles is 79 ft.; of the choir 38 ft.; of Henry VII.'s Chapel 70 ft. The height of the roof is 102 ft., a loftiness unusual in English churches. It is the interior of the abbey which has at all times excited the most enthusiastic admiration. The harmony of its proportions, and the 'dim religious light' of the lofty and long-drawn aisles, leave on the mind impressions of grandeur and solemnity which many churches of greater size fail to produce. The abbey was at one time the burying place of the English kings, and it has become a national honor to be interred within its walls. It is crowded with tombs and monuments. The Chapel of Edward the Confessor, at the e. end of the choir, contains his shrine erected by Henry III., the altar-tombs of Edward I., Henry III., Henry V., and Edward III. The canopy of the tomb last mentioned deserves especial notice: it is considered one of the greatest works in wood extant, and equal to anything in the best age of mediæval art. Against the altar-screen in this part of the church stand the two coronation chairs. One, the king's chair, incloses the stone brought by Edward I. from Scoue, on which the Scotch kings were crowned (see SCONE: CORONATION).

WESTMINSTER.

The other, the consort's chair, was constructed for the coronation of Mary, wife of William III. Both are still used at coronations. Most of the English sovereigns, from the time of Henry VII. to that of George III., were buried in Henry VII.'s Chapel, and there accordingly are the tombs of Queen Elizabeth and Mary Queen of Scots. The most remarkable monuments in other parts of the church are in the e. aisle of the s. transept, known as 'Poets' Corner,' where many of the most eminent British poets have been buried, and where are monuments to Chaucer, Beaumont, Drayton, Cowley, Dryden, Milton, Gray, Prior, Shakespeare, Thomson, Gay, Goldsmith, Addison, and Ben Jonson. In the n. transept are monuments of Pitt, Fox, Chatham, Canning, and Wilberforce. Elsewhere are monuments of great engineers and inventors—Telford, Watt, and Stephenson.

Since Dean Stanley (q.v.) became connected with the abbey 1864, much has been done to restore and improve the interior; and services conducted in it have attracted much public interest—especially the anniversary of the foundation, celebrated 1865, Dec. 28; and the mission sermon delivered by Prof. Max Müller 1873, Dec. 3, when the dean of an abbey asserted his right to allow a layman to preach there.

South of the abbey are the Pyx House, chapter-house—since 1866 restored under the direction of Sir Gilbert Scott—cloisters, and the building occupied by W. School, formerly the monks' dormitory, etc. W. School was founded by Queen Elizabeth for education of 40 boys known as queen's scholars, who are prepared for the universities. Other persons send their sons to it, and it has long been one of the leading public schools of England.

The city of W. sprang up round the abbey; and the English kings, from their jealousy of the privileges claimed by the citizens of London, early made their abode there. Before Edward the Confessor began to build his new church at W., the residence of the English kings had been in the Roman fortress in London, or in the Saxon city of Winchester. The king, to superintend the building of the church, made his abode in the palace. William Rufus erected a palace between the abbey and the Thames 1097. Its chief apartment was a banqueting-hall, which, as it had become ruinous in the time of Richard II., that king pulled down, and erected, 1397-99, on the same site, indeed on the same foundations, the great W. Hall, which still stands: it is 90 ft. high, 290 ft. long, 68 ft. wide, and is roofed by 13 great ribs of timber, combined with a mechanical skill not excelled in any work of the present age. The roof of W. Hall is the finest specimen of the purely English art of forming a Gothic roof of wood: except, perhaps, the Hall of Justice at Padua, it is the largest roof in Europe unsupported by pillars. The law courts established at the hall 1224 were removed to the New Law Courts erected in the Strand 1882.

The old houses of parliament which adjoined the hall, and like it lay between the abbey and the Thames, were

WESTMINSTER ASSEMBLY—WESTMORELAND.

burned to the ground 1834. It was then determined to erect a new building on the same site, but on a much grander scale. The designs of Sir Charles Barry for 'the New Palace of Westminster' were selected, and the work was begun 1840. This magnificent building may be said to form a parallelogram, 900 ft. long by 300 ft. wide. The principal rooms are the house of lords and the house of commons, which occupy the centre of the building, and extend on the line of its greatest length. They are separated by an 'Octagon Hall,' with a diameter of 70 ft. From this hall one corridor runs n. to the house of commons, and another s. to the house of lords, beyond which are the royal apartments at the extreme s. of the building. The entrance to the Octagon Hall is by a passage known as St. Stephen's Hall, which communicates by flights of steps with an entrance in the e. front, and also with Westminster Hall, which, grouped with the new building, forms its n. vestibule. The state entrance of the sovereign is at the s.w. extremity, and is in direct communication with the royal apartments. The building is surmounted by lofty spires and towers. In the centre, above the Octagon Hall, rises the central tower, 300 ft. high. At each corner are towers—at the s.w. the Victoria Tower, 346 ft. high; at the n.w. the clock-tower, surmounted by a belfry spire 320 ft. high. The clock has four faces, each 30 ft. in diameter; and it strikes the hours on a bell weighing 9 tons, known as Big Ben. The chief subject of regret in connection with the edifice is, that the stone of which it was built, a magnesian limestone from Yorkshire, has rapidly decayed. See *Historical Memorials of W. Abbey* (3d ed. 1869); *Dedication of W. Abbey*, by Dean Stanley; Walcott's *Memorials of W.* (1851).

WESTMINSTER ASSEMBLY: see ASSEMBLY OF DIVINES: CREEDS AND CONFESSIONS.

WESTMINSTER SCHOOL, or ST. PETER'S COLLEGE: school founded 1560 by Queen Elizabeth for instruction of 40 scholars in Latin, Greek, and Hebrew: see WESTMINSTER, THE CITY AND LIBERTY OF. It was reorganized under the Public Schools Act (1868), and is recognized as one of the 9 great public schools of England. Instruction is now given to about 200 boys.

WESTMORELAND, *wĕst-mŏr'land*: northern inland county of England; bounded e. by Yorkshire, s. and w. by Lancashire, n. by Cumberland and Durham; length 42 m., breadth 40 m.; 505,864 acres, of which (1887) 207,017 acres were in permanent pasture, about 65,000 acres under crop, 8,519 acres under water, and 114,282 acres commons or waste lands. Tillage is mostly confined to the valleys. There is some lead-mining; the manufactures are unimportant. W. is mountainous. The chief summit is Helvellyn (3,055 ft.), partly in Cumberland. The other more important summits are Loughrigg Fell, Bowfell, Crossfell, and High Street and Langdale Pikes. Lakes remarkable for beauty occur. The chief are Windermere (q.v.), partly belonging to Lancashire; and Ullswater (q.v.), between W. and Cumberland. Moorlands are

WESTON—WESTON-SUPER-MARE.

numerous and extensive; but along the courses of the Kent in the s., and the Eden in the n.—the principal streams—there are tracts of fertile land. The climate is mild and moist, often with much snow in winter, the deep drifts of which sometimes prove fatal to travellers on the mountain tracks. The soil is mostly a dry gravelly mold, favorable to culture of turnips, of which great crops are produced. Rich pasture-lands abound, and cattle, mostly of large size, are extensively reared. The county town is Appleby (on the Eden); other chief towns are Ambleside, Kendal, and Kirkby-Lonsdale.—Pop. (1871) 65,005; (1881) 64,191; (1891) 66,098; (1901) 64,411.

WESTON, *wēs'ton*, EDWARD: electrician: b. England, 1850, May 9. He came to the United States 1870, was appointed chemist to a nickel-plating company, began studying electrical apparatus 1872, produced the first copper-coated carbons 1873, and established at Newark, N. J., the first plant in the United States for exclusive manufacture of dynamo-electric machinery 1875. He has since applied himself to the manufacture of dynamos and of arc and incandescent lighting apparatus. W. was a charter member of the Amer. Institute of Electrical Engineers, and its pres. 1888.

WESTON, THOMAS: about 1575—after 1624; b. England. He was a merchant in London, and advanced money to the Pilgrims to aid them in fitting out the *Mayflower* expedition; and induced them to form a joint-stock company on nearly his own terms. But the company not proving as profitable to him as he expected, he soon sold his interest in it, and 1622 formed a new one under the grant given to Sir Ferdinando Gorges by the king. This company, composed of the roughest elements, landed at Plymouth 1622, June, and after remaining there two months, a burden to the weak and struggling colony, determined to settle at Wessagussett (now Weymouth). But they were idle, shiftless, and profligate to such a degree that even the Indians despised them and determined to attack them. Miles Standish, hearing of this, marched against the Indians, killed two of their chiefs, and carried a part of the colony back to Plymouth; the rest became scattered, some eventually returning to England. Weston arrived soon after this, and Robert Gorges, agent of Sir Ferdinando Gorges, endeavored to bring him to account for some of his unscrupulous proceedings; but Bradford and others interceded for him; his vessel, which Gorges had seized, was released, and he was permitted to sail for the coast of Va., and soon returned to England.

WESTON-SUPER-MARE, *wēs'ton-sô'pēr-mā'rē*: seaport town and watering-place in Somerset co., Eng.; on Uphill Bay, Bristol Channel; 138 m. w.s.w. of London, 20 m. s.w. of Bristol. A citadel, whose ruins are still visible, was here in the time of Edward the Confessor; but the town is entirely modern. Worlebury Hill, on which the citadel was built, protects it on the n. and e.; and this, with its bracing and dry air, has made it a desirable winter resi-

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dence as well as a favorite summer resort, and many business men of Bristol have homes here. It is noted for its potteries, and sprat and herring fishing is an industry.—Pop. (1881) 12,884; (1891) 15,873.

WESTPHALIA, *wĕst-fă'lli-a*: province of Prussia; bounded n.w. by Holland, n. by Hanover, e. by Hanover, Lippe-Detmold, Schaumburg-Lippe, Brunswick, and Hesse-Nassau, s.w. by the Rhine Province; greatest length 124 m., greatest breadth 110 m.; 7,800 sq. m. W. is divided into three districts—Münster in the n.w., Minden in the n.e., Arnsberg in the s. The east presents vast plains covered with grain, while the n.w. is a flat expanse of uncultivated land. The climate is generally temperate. The chief rivers are the Weser (q.v.), the Ems, the Lippe, and the Roer or Ruhr, each navigable for considerable part of its course. The prosperity of W. is due chiefly to its flax crops and to its mineral treasures, especially coal and iron. The chief industrial products are iron, and articles of iron, steel, and copper from the forges of Arnsberg; while manufacturing industry embraces flax-spinning and linen-weaving in Minden, and extensive production of woollen articles, stockings, and ribbons of esteemed quality. Exports consist of these products, and of meat, especially hams. The cap., Münster (q.v.), had, till 1818, a univ., now a higher acad.—W. derives its name from the West-falen, a section of the great Saxon people, who migrated hither from the banks of the Elbe soon after the Christian era; and after the subjugation of the Saxons by Charlemagne, the deposed leader, Wittekind, was allowed to remain *Duke of the Engern and West-falen*. At this time the country called W. (and occasionally *Sauerland*) comprised all Germany between the Weser, Rhine, and Ems; and soon afterward it was subjugated by the dukes of Lower Saxony, and held by them, till on the rebellion of Henry the Lion, 1179, the electoral abp. of Cologne extended his sway over it. It then became one of the circles of the empire, and belonged to the Cologne electorate till 1802, when most of it was given to the Hesse-Darmstadt family. In 1807 arose the *kingdom of Westphalia*; which, besides a portion of W., included Electoral Hesse, Hanover, Brunswick, and portions of Upper Saxony. This kingdom, erected by Napoleon as preliminary to its incorporation into France, was given to his youngest brother, Jerome, who made Cassel his capital; and, despite the large French garrisons with which the country was burdened, and the extensive contributions in men and money which it was forced to pay to Napoleon, succeeded—by the establishment of the Code Napoleon, and by showing in various other ways his strong desire to promote the welfare of his new subjects—in acquiring their esteem. But the oppressive conscriptions and taxes for the behoof of the French army and treasury gradually increased in amount, and excited such resentment that Jerome's life was several times threatened. The king repeatedly remonstrated with Napoleon, but without the slightest effect; and in spite of his efforts, the 'Continental System' (q.v.)

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was introduced into his states. In 1813 Jerome was driven from Cassel by the Russians; and though he returned for a few days, the defeat of Leipzig forced him to take shelter in France. By the treaty of Vienna, the states which had been joined to W., to form the kingdom, were restored to their former possessors, and W. itself, except a portion which had been annexed to Hesse-Darmstadt, was united to Prussia.—Pop. (1885) 2,202,126, of whom 52 per cent. are Rom. Cath., 46 per cent. Protestants, the remainder Jews, etc.; (1890) 2,428,661; (1900) 3,187,777.

WESTPHALIA, TREATY OF; or TREATY OF MÜNSTER: treaty concluded 1648 at Münster and Osnabrück (towns in the circle of Westphalia), which put an end to the 'Thirty Years' War (q.v.), restored tranquillity to Germany, established a new system of political equilibrium in Europe, and became the basis of all subsequent treaties till the French Revolution. The minor states of Germany had long desired cessation of hostilities; and as early as 1638, plenipotentiaries from France, Sweden, and the empire had assembled at Hamburg; but it was not till several years after that all parties agreed to Münster and Osnabrück as the places, and to 1642, Mar. 26, as the time of meeting of the congresses, which, however, did not open until 1644. The two places of meeting were chosen to avoid rivalry between France and Sweden for supremacy, to prevent collision between the Swedish representatives and the pope, and to separate the Rom. Catholics from the Protestants. The representatives of France, the empire, Spain, and the Rom. Catholics of Germany met at Münster under the mediation of the pope; and those of Sweden, the empire, and the Protestants of Germany under the mediation of the king of Denmark; the representatives of Spain, Portugal, the United Provinces, Savoy, Tuscany, Lorraine, Mantua, and Switzerland being also present; so that this congress included all the great European powers except Great Britain, and almost all the minor powers. It was not till Torstensohn's decisive campaign 1644–5 that negotiations began in earnest and the representatives made specific propositions. The successes of Turenne and Wrangel in s. Germany, and the capture of Prague by the Swedes under Königsmark 1648, July, at length overcame all the emperor's dilatoriness, and, the Osnabrück representatives having arrived at Münster a few days before, the treaty was finally signed there 1648, Oct. 24.

Its terms, as regards the Germanic empire, were as follows: the sovereignty and independence of the different states of the empire were fully recognized, and liberty was given them to contract any alliances with each other, or with foreign powers, if these were not against the emperor or the empire; all religious persecution in Germany was forbidden; the treaty of Passau and the religious peace of 1555 were confirmed; and with respect to the secularization of ecclesiastical benefices, everything was to remain in Austria as it was in 1624 (hence called the *normal year*), and in the Palatinate, Baden, and Württemberg as it was in 1618; the power of putting under the ban of the empire

WESTPHALIAN TRIBUNALS—WEST POINT.

was to be exercised only with consent of the diet; and the Reformed were put on a footing of equality as to privileges with the Lutherans. The territorial changes were as follows: the Lower Palatinate was restored to the eldest son of the unfortunate 'Winter King' (Frederick V., Elector Palatine), and an eighth electorate was created in his favor; but the Upper Palatinate and Cham were given to Bavaria, on condition that, should the two states become united, one electorate was to be abolished (as happened 1777: see BAVARIA); part of Alsace was ceded to France; Upper Pomerania, Rügen with Stettin, Gartz, Damme, Golnau, the isle of Wollin, Peine, Schweine, and Divenau in Lower Pomerania, Wismar, the secularized archbishopric of Bremen as a duchy, and the bishopric of Verdun as a principality, were obtained by Sweden as fiefs of the empire, with three deliberative voices in the diet, and an indemnification of 5,000,000 crowns to be paid by the empire; Brandenburg obtained, as compensation for its cessions in Pomerania, the secularized archbishopric of Magdeburg as a duchy, and the bishoprics of Halberstadt, Minden, and Camin; Hanover and Mecklenburg were compensated for their share in these cessions by secularized church lands; and Hesse-Cassel obtained the rich abbacy of Hirschfeld, with 600,000 thalers. The independence of the United Provinces was recognized by Spain, and that of Switzerland by the empire. The pope's agent, Fabio Chigi (afterward Pope Alexander VII.), protested vigorously against the liberal alienation of the possessions of the Church, and withdrew; and the king of Denmark's mediation being stopped by his war with Sweden 1644, the treaty was concluded under the sole mediation of the republic of Venice; and France and Sweden guaranteed its execution. France, Sweden, and the Protestants were the only gainers by this treaty, which, by weakening the great central authority of the empire, destroyed its unity, allowed France, as one of the guarantors, a pretext for continual interference with its internal affairs, and gave the *coup de grace* to the independence of the remaining free cities of the empire.

WESTPHA'LIAN TRIBU'NALS: see FEMGERICHTE.

WEST POINT: post-village, milit. post, and seat of the U. S. Milit. Acad. (q.v.); in Highland tp., Orange co., N. Y.; on the Hudson river, and on the New York Ontario and Western and the West Shore railroads; 52 m. n. of New York. As a milit. post W. P. has had large importance since the beginning of the revolutionary war. It is in the s. angle of a sharp bend in the river, and its elevated, rocky site was most favorable for construction of fortifications that would command the passage of the river. Fort Clinton was built on the crest of the highest of three terraces, 188 ft. above the water, and spreading out in a plain more than a mile in circumference; and Fort Putnam on an eminence in the rear, 598 ft. above the river. Other works were laid out on Constitution Island, in the n. angle of the river bend, a rocky mass 130 ft. above the water. Crow Nest and Butler Hill are n.w. of the 'point' proper;

WEST POINT.

Bull Hill and Breakneck are n.; Sugar-loaf Hill and Anthony's Nose are s.; and Fort Independence was 1 m. s. of the Nose. A heavy chain was buoyed across the river in the revolutionary war, and the British made many attempts to gain possession of the post, and once nearly succeeded through the treason of Benedict Arnold (q.v.: see also ANDRÉ, JOHN). The earliest fortifications on Constitution Island and on Pooplopen's creek were taken and demolished by the British 1777; but after Burgoyne's surrender they were abandoned. The defensive works were planned by Lieut.col. Radière, engineer, who was succeeded by Kosciusko, the Polish hero. Besides numerous redoubts and batteries, they included Forts Putnam, Clinton, Webb, Wyllis, and Meigs, and at the time of Arnold's treason they had cost about \$3,000,000. Construction operations were continued till about 1794, but the works were never finished as planned. During 1891 the govt. expended \$1,000,000 in improving the post, especially the grounds and buildings of the acad., and one of the most notable changes was the demolition of the old historic academic building, on the most prominent spot on the post, to make room for a new building, larger than the old one, that will cost \$450,000. A new gymnasium was erected at the w. end of the barracks, a new cav. barracks near the cav. stables, and a new hospital for enlisted men in a large open field. The rare beauty of its location, the presence of the Milit. Acad. and the cemetery in which are buried the remains of many great milit. leaders, and the proximity of Cold Spring, Highland Falls, Stony Point, Verplanck's Point, Cornwall, Newburgh, and other summer resorts, have given W. P. much popularity as a place for summer excursions and residence.

WEST POINT—WEST TROY.

WEST POINT: town in King William co., Va.; at the junction of the Pamunkey, Mattaponi, and York rivers; at terminus of the Richmond and Danville railroad; 38 m. e. of Richmond; in a region which was the scene of memorable events in the civil war. W. P. ranked 1890 as the 6th cotton-shipping port in the United States. It has extensive docks and wharves, is supplied with water for drinking and cooking by about 200 artesian wells, and does a large business in lumbering, canning oysters, and manufacturing fertilizers from phosphatic marl and potash deposits on the Pamunkey. There were (1891) 2 cotton compresses, 4 oyster-packing houses, hosiery-mill, planing-mill, and tinware-works; 2 female seminaries, one male acad., several public and private schools, and large hotel and sanitarium; regular steamship communication with Baltimore, New York, and Boston; gas and electric light plants.—Pop. (1890) 2,018; (1900) 1,307.

WESTPORT, *wĕst'pōrt*: small seaport of Ireland, prov. of Connaught, county Mayo; at the mouth of a small stream that falls into Clew Bay; about 35 m. n.n.w. of Galway. Formerly W. was supported principally by linen manufactures; but is now known mostly for its trade in grain and provisions, and for its facilities for sea-bathing. In the immediate vicinity is the Reek, a mountain 2,510 ft. high.—Pop. 4,469.

WEST PRUS'SIA: see PRUSSIA, PROVINCE OF.

WEST SUPE'RIOR: see SUPERIOR (city, Wis.).

WEST TROY: a former village in Albany co., N.Y., on the Hudson river, and on the Dela. and Hudson Co.'s railroad; opposite Troy. It is connected with Troy by a bridge and steam-ferry, and, besides being at one of the entrances of the Erie and Champlain canals into the Hudson, is at the head of navigation on the river. It thus has direct water-communication with New York and with the shipping-points on Lakes Champlain, Erie, and Ontario. The principal trade is in lumber, shipped by canal directly from Mich.; but it has manufactories of car-boxes, bells, butts and hinges, woolen shawls, horse-cars, stoves, hollow-ware, and lime and cement. It has gas and electric light plants, 12 churches, 4 public schools, 3 seminaries, 1 national bank (cap. \$100,000), and 1 weekly newspaper. W. T. was (prior to 1896) the largest village in the state, when the town of Watervliet, with the villages of Green Isl. and and W. T. was chartered as a city, under the name of Watervliet. It is the seat of the Watervliet U. S. arsenal, which occupies 105 acres in the centre of the village, and manufact. large quantities of army equipments and ordinance. Pop. (1880) 8,820; (1890) 12,967.

WEST VIRGINIA.

WEST VIRGINIA: state; one of the United States of America; 35th in order of admission into the Union, 22d under the federal constitution; created a state from 39 w. counties of Va., and admitted 1863, June 20; popularly known as 'The Panhandle State,' also as 'The Mountain State.'

Location and Area.—W. V. is in lat. $37^{\circ} 6'$ — $40^{\circ} 40'$ n., long. $77^{\circ} 40'$ — $82^{\circ} 35'$ w ; bounded n.w. by O., n. and n.e. by Penn. and Md., e., s.e., and s. by Va., w. by Ky. and O.; extreme breadth, e. to w., 160 m.; extreme length, n. to s., 240 m.; land surface 24,645 sq. m., water surface 135 sq. m., gross area 24,780 sq. m. (15,859, 200 acres); cap. Charleston.

Topography.—In general the surface is mountainous and the soil clay. A narrow strip between the Penn. boundary and the Ohio river is known as the 'Panhandle' and is very fertile. The Shenandoah valley or valley of Virginia includes the counties bordering on the Potomac river, and w. of this is the Appalachian country, which shows high. The 'hilly' region succeeds this and extends to the Ohio mountain ridges with intervening valleys of much fertility. river. The highest elevations are on the Alleghany range, which forms the e. boundary and has peaks averaging 2,500 ft. high. A continuation of the Cumberland range is nearly parallel to the Alleghanies on the w., and 20–40 m. distant; and this contains many noted elevations, among them Flat Top, Greenbrier, Cotton Hill, Gauley, Laurel Hill, and Birch and Rich Mountains. The Ohio river furnishes steam-navigation along the whole w. boundary, about 300 m., and receives all the principal streams of the state, except the Potomac and its affluents. The largest rivers flowing into the Ohio are the Gnyandotte. Great Kanawha, Little Kanawha, Big Sandy, and the Monongahela, all navigable and affording valuable water-power. The chief streams feeding the Potomac, which forms the n.e. boundary for 100 m., are the North and South branches. The valley of the Great Kanawha is an exceptionally rich grazing country, where the famous blue-grass is indigenous.

Climate.—The climate is remarkably equable, with no great extremes of heat or cold; mean annual temperature $52^{\circ} 46'$; average rainfall 35.75 in. in highest elevation, 55.84 in lowest.

Geology.—The principal economic properties of the state are coal, chiefly bituminous, but with some excellent cannel, coking, and gas coal; iron; sandstone; limestone; petroleum; salt; fire and potter's clays; plain and variegated marbles; buhrstone; and numerous mineral springs of large value and wide popularity. The coal-measures are believed to cover more than 15,000 sq. m ; the virgin forests about 9,000,000 acres. The principal woods are oak, poplar, hemlock, walnut, cherry, buttonwood, ash, chestnut, and locust. The soils range from clay to sand, loam, calcareous, and alluviums, both stream and upland; and even among the mountains are either highly productive or may be made so with slight cultivation.

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Zoology.—Much of the animal life of Va. is found here also. Game-birds include wild turkey, grouse, snipe, and woodcock; wild animals, panther, wild cat, black bear, wolf, raccoon, opossum, and ground-hog; and food animals, elk, deer, rabbit, and hare.

Agriculture.—In 1890 the farm lands covered 10,321,326 acres, of which 4,554,000, or 44.1 per cent., were improved; these were in 72,773 farms valued at \$151,880,300, implements and machinery \$3,116,420, live stock \$23,964,610, farm products for the year \$20,439,000. The live stock consisted of 154,722 horses, 7,390 mules and asses, 29,366 oxen, 188,492 milch-cows, 348,208 other cattle, 411,018 swine, 785,063 sheep. The principal products were: barley 5,387 bu., buckwheat 120,469 bu., Indian corn 13,730,506 bu., oats 2,946,653 bu., rye 117,113 bu., wheat 3,634,197 bu., hay 550,645 tons, tobacco 2,602,021 lbs., Irish potatoes 1,987,367 bu., sweet 109,385 bu., wool 2,560,859 lbs., milk 59,449,066 gals., butter 14,063,627 lbs., cheese 74,372 lbs., eggs 8,446,259 doz., orchard products 4,939,464 bu. In 1895 the principal crops were: corn 16,662,789 bu., wheat 4,303,780 bu., oats 3,539,320 bu., potatoes 2,297,631 bu., hay 357,425 tons, tobacco 2,527,000 lbs., wool 2,627,455 lbs. Sheep April 1, 1896, 477,719. In 1900 there were reported 92,874 farms, covering 10,654,513 acres, of which 5,498,981 acres were improved and 5,155,532 acres unimproved, and all farm property, including buildings, implements and machinery, and live stock, was valued at \$323,515,977. In 1902 the principal crop productions were: corn 20,512,616 bu., 774,061 acres, \$11,076,815; oats, 2,448,560 bu., 85,614 acres, \$1,003,910; wheat 2,743,233 bu., 356,264 acres, \$2,249,451; rye, 37,723 bu., 10,830 acres, \$59,652; tobacco 2,909,260 lbs.; 4,076 acres, \$386,604; potatoes 3,090,432 bu., 32,192 acres, \$1,576,120; hay, 579,761 tons, 517,644 acres, \$8,307,975. The farm animals 1902 comprised 167,389 horses, value \$10,651,014; 10,297 mules, \$727,712; 173,628 milch cows, \$5,080,180; 359,593 oxen and other cattle, \$7,259,350; 705,382 sheep, \$1,926,115; 300,686 swine, \$2,231,090; total head 1,721,975, val. \$27,875,461.

Manufactures.—W. V. had (1880) 2,375 manufacturing establishments, employing 14,311 hands, using \$13,883,390 capital, paying \$4,313,965 for wages, using materials valued at \$14,027,388, and yielding products valued at \$22,867,126. The chief industry according to capital employed was the manufacture of iron and steel, which had 20 establishments, 4,121 hands, \$3,913,616 capital, \$1,541,816 wages, \$3,484,625 materials, and \$6,054,032 products. Next were flour and grist mill products, 472 establishments, 746 hands, \$1,777,297 capital, \$140,508 wages, \$3,384,797 materials, and \$3,942,818 products. Then followed sawed lumber, 472 establishments, 2,183 hands, \$1,668,920 capital, \$459,945 wages, \$1,375,872 materials, \$2,431,857 products; salt, 15 establishments, 736 hands, \$910,500 capital, \$160,227 wages, \$192,113 materials, \$380,369 products; glass, 4 establishments, 946 hands, \$550,523 capital, \$311,650 wages, \$208,064 materials, \$733,500 products; tanned leather, 93 establishments, 301 hands, \$515,855 capital, \$90,338 wages, \$1,089,620

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materials, \$1,451,528 products; foundry and machine-shop products, 35 establishments, 406 hands, \$388,300 capital, \$158,474 wages, \$168,921 materials, \$466,862 products; and woolen goods, 55 establishments, 350 hands, \$293,170 capital, \$44,161 wages, \$245,843 materials, \$356,986 products. In 1900 W. Va. had 4,418 manufacturing establishments, requiring a capital of \$55,904,238, employing 33,272 hands, paying \$12,969,237 in wages, and \$43,006,880 for materials, and producing \$74,838,330 of products. The leading industries were:

MANUFACTURING INDUSTRIES OF WEST VIRGINIA 1900.

Industries.	Estab- lish- ments.	Em- ployees	Wages.	Mate- rials.	Prod- ucts.
Brick and tile	42	550	\$ 184,376	\$96,969	436,356
Coffee and spice . . .	4	11	5,085	201,734	224,376
Coke	77	3,131	890,024	1,966,682	3,529,241
Flouring and grist mill products . . .	737	314	154,623	4,555,003	5,541,353
Foundry and ma- chine-shop prod- ucts	62	591	317,293	666,244	1,401,852
Glass	16	1,949	789,422	593,251	1,871,795
Iron and steel	11	4,467	2,293,524	10,422,322	12,514,212
Leather, tanned and curried	46	664	224,444	2,541,197	3,210,753
Liquors, malt	8	256	117,320	199,724	1,113,027
Lumber, saw-mill products	950	5,327	1,828,588	5,584,717	10,612,837
Lumber, planing- mill products . . .	83	555	238,595	1,199,914	1,820,463
Paper & woodpulp . .	6	281	98,329	274,316	727,527
Slaughtering and meat packing . . .	3	84	42,646	133,954	1,337,579
Ptng and publishing	178	810	333,061	215,868	1,034,078
Tobacco, cigars and cigarettes	72	910	332,223	250,490	1,060,126
Woolen goods	33	384	99,027	319,313	507,300

The internal-revenue receipts for year ending 1890, June 30, were: distilled spirits \$259,436.08; tobacco \$488,500.84; fermented liquors \$113,146.18; oleomargarine \$1,210.00; penalties \$42,375.67—total \$904,668.77.

Mines and Quarries.—In 1880 the reported production of the various mines was: bituminous coal, 1,792,570 tons, value \$1,971,847; iron ore, 60,371 tons, \$88,595; and minor minerals, value \$4,500; total value of products \$2,064,942. There were ten quarries in operation, employing 154 hands and 16 machines, having a capital investment of \$55,350, and yielding 294,700 cubic ft. of products, valued at \$16,689. All quarrying was in sandstone. During 1880-90 coal-mining became the most important industry of the state, which advanced thereby from 7th to 4th rank among the states. The state is divided into two mining districts, with a state inspector for each.—Official reports for the year ending 1891, June 30, showed: 1st dist., comprising Harrison, Taylor, Ohio, Preston, Marion, Monongalia, Mineral, Marshall, Brooke, and Tucker cos., mines in operation 43, hands employed 3,423, output 2,145,379 long tons; 2d dist., comprising Mason, Putnam,

WEST VIRGINIA.

Kanawha, Fayette, Mercer, and McDowell cos., mines in operation 136, hands employed 10,655, output 5,136,051 long tons—total 7,281,430 tons.

Similar progress was reported as made in the coke industry. In 1880 there were 12 ovens in operation, employing 163 hands, using materials valued at \$138,964, and yielding 95,720 tons of products, valued at \$216,588. In 1891 there were in the 1st dist. 1,207 ovens in operation and 255 building, and a product of 314,758 long tons; and in the 2d dist. 2,910 ovens in operation and 522 building, and a product of 923,660 long tons. In 1892 there were 5,490 ovens—increase 1,373—and 1,313,449 tons output.

In 1880 W. V. produced sandstone to the value of 16,689; (1890) \$140,687. In 1890 there were 27 quarries in operation, which had \$181,158 capital investment and \$80,704 expenses, and yielded 964,263 cubic ft., of which 412,053 cubic ft. were used for building purposes, 510,135 for bridge, dam, and railroad work, and 42,075 for street work. There were 8 quarries of limestone, which had capital investment \$217,188, expenses \$51,323, and product of 194,250 cubic ft. for building purposes, 21,600 short tons for furnace flux, and 25,000 cubic ft. for bridge, dam, and railroad work—total value \$93,856.

Commerce.—W. V. belongs to the U. S. customs district of La., and its imports and exports are through the port of New Orleans. Wheeling is a port of entry and delivery, receiving imports in bond after appraisement at New Orleans. The shipping enrolled and licensed at the Wheeling custom-house 1891 was 103 vessels of 10,747.75 tons, all steam; and 17 vessels of 2,622.78 tons were built in the district in the fiscal year 1890-1. A U. S. surveyor of customs is stationed at Wheeling, and a collector of internal revenue at Grafton. The interstate trade in manufactures, coal, iron, lumber, and salt is very large, by water and rail.

Railroads.—In 1880 there were 691 m. of railroad in operation in the state; 1890 the mileage was 1,343, owned or leased by 31 corporations; assessed valuation of railroad property \$17,386,726; taxes paid, for state purposes \$38,312.14, general school purposes \$15,324.87, co. purposes \$111,729.55, district \$80,723.58, and municipal \$16,475.29—total \$262,565.43. Mileage (1892) 1,806, (1893) 1,895, (1894) 1,977, (1895) 2,075. In the last year named the total capital invested was \$76,805,009, gross earnings \$4,007,133, net earnings \$1,285,561, interest \$1,166,892, dividend \$149,887. In 1902 the total mileage was 2,383.

Religion.—The Meth. Episc. is the strongest denomination in the state, and 1889 reported 1 conference, 9 districts, 510 churches, 245 local and 153 travelling preachers, 41,849 members, 627 Sunday schools, 5,238 officers and teachers, 33,429 scholars, 94 parsonages, church property valued at \$779,060, parsonages \$105,150, and \$77,240 contributions for ministerial support.

The Bapt. Churches reported (1892) 18 assocs., 532 churches, 286 ministers, 37,100 members, 262 Sunday schools, 1,788 officers and teachers, 13,025 scholars, church

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property valued at \$387,905, and aggregate contributions \$61,668.

The Presb. Church in the United States reported, 1892, the presbytery of Greenbrier, wholly within W. V., with 46 churches, 20 ministers, 3,120 members, 234 Sunday-school teachers, 2,303 scholars, \$9,999 pastors' salaries paid, and 5,298 congregational contributions; and parts of the presbyteries of Lexington, Montgomery, and Winchester. All these presbyteries belong to the synod of Va., and for combined report on W. V. and Va., see VIRGINIA—*Religion*.

The Prot. Episc. Church reported, 1892, diocese of W. V. (organized 1877), comprising the whole state: 1 bp., 55 parishes and missions, 23 clergy, 2,983 communicants, 377 Sunday-school teachers, 2,865 scholars, \$56,643 contributions, and Sheltering Arms Hospital, Orphanage, and Home, at Paint Creek.

The Rom. Cath. Church reported, 1892, diocese of Wheeling (established 1850), comprising parts of W. V. and Va. (see VIRGINIA—*Religion*): 1 bp., 64 churches, 48 chapels and stations, 35 priests, 1 college, 6 academies, 14 parochial schools, 1,800 pupils, 2 orphan asylums and a hospital at Wheeling, and estimated Rom. Cath. pop. 20,000.

The Conservative branch of the Brethren or Dunkards reported (1890) 33 organizations, 32 churches, 3 halls, 2,710 members, and church property valued at \$21,635.

At the tenth international Sunday-school convention, at Denver, Col., 1902. June 26-30, there were reported in W. Va. 2,024 Sunday schools, 20,545 officers and teachers, 152,945 scholars; total members 173,490.

Education.—In 1890 the white school population was 268,326, of whom 121,700 were in average daily attendance, and the colored school population was 10,497, of whom 6,209 were enrolled and 3,589 were in average daily attendance. There were 4,814 public schoolhouses; 5,491 teachers (180 in colored schools), to whom were paid \$832,961 in salaries; \$1,293,164 total expenditures; school property valued at \$2,483,528; \$620,011 in permanent school fund; and \$300,431 in general school fund. In the school year 1888-9 public normal schools (6) were maintained at Fairmont, Glenville, Harper's Ferry, Huntington, Shepherdstown, and West Liberty, which combined had 31 instructors, 495 male and 426 female (921) pupils, and \$19,686 receipts; and there was one private normal school at Buckhannon, which had 8 instructors and 114 pupils. Storer College, at Harper's Ferry, classed as a public normal school, was exclusively for colored youth, and had 9 instructors and 194 pupils. Of schools for private secondary instruction, there were: for *boys*, Charlestown Male Acad., chartered 1795, 2 instructors and 46 pupils; for *girls*, Acad. of the Visitation, Parkersburg, 1864 (Rom. Cath.), 13 instructors and 100 students, and Seguin College Institute, Wheeling, 1868 (non-sect.), 4 instructors and 70 pupils; and for *both sexes*, St. Mary's Acad., Charleston, 1861 (Rom. Cath.), 4 instructors and 92 pupils. There were 3 institutions for higher instruc-

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tion of women: Broadus College, Clarksburg, opened 1871 (Bapt.), 7 instructors, 60 students, \$10,000 in grounds and buildings, and 1,200 income; Parkersburg Female Seminary, 1878 (non-sect.), 3 instructors and 35 students; and Wheeling Female College, chartered 1848 (non-sect.), 9 instructors, 64 students, and \$16,000 in grounds and buildings.

The State Univ., at Morgantown, chartered 1867 (non-sect.), had 18 professors and instructors; 79 students in the preparatory dept., 102 in the collegiate, 19 in the professional; 5,600 vols. in library; \$10,000 in scientific apparatus; \$100,000 in grounds and buildings; \$107,000 in productive funds; and \$36,800 in total income; pres., Eli M. Turner, LL.D. In 1889 the collegiate dept. was opened to women. Other colleges of liberal arts were: (1) Bethany College, Bethany, 1840 (Christian), 10 professors and instructors; 99 male and 32 female (131) students; 2,000 vols. in library; \$135,000 in grounds and buildings; \$60,000 in productive funds; \$3,000 total income; and \$20,000 benefactions; pres., W. H. Woolery; and (2) West Virginia College, Flemington, 1868 (Free-will Bapt.), 4 professors and instructors; 45 male and 12 female (57) students; \$12,000 in grounds and buildings; and \$309 total income; pres., Thomas E. Peden. The State Univ. had one professional school, law, and the state agricultural experiment station, established under a general act of congress (1862). A later act (1890) provides a further endowment for colleges established under the 1862 land act, of \$15,000 for each college for the year 1890, and an annual increase of \$1,000 till the annual amount reaches \$25,000, which sum shall thereafter be the annual appropriation. The act of congress aims to provide instruction in agriculture and the mechanic arts, and makes its endowment conditional on the admission to such colleges of white and colored students on equal terms, excepting where separate colleges are established for the two races. As the constitution of the state provides that white and colored persons shall not be taught in the same schools, the state had not been able to avail itself of this aid from the federal govt. (1891), and could not do so without amending its constitution or founding a separate agricultural and mechanical college for colored students.—In 1895-6 W. Va. had 285,600 children from 5 to 18 years of age, of whom 215,665 were enrolled in the public schools and 141,081 in average daily attendance; there were 6,454 teachers employed in 5,475 school buildings which were valued at \$3,227,141; income from taxation \$1,550,971, permanent funds \$50,000, total \$1,812,501; expenditures \$1,793,649, of which \$223,070 went for sites, buildings, and equipments, \$1,112,513 for salaries, and \$458,065 for other purposes. Pupils in private schools numbered 1,894, making the total enrolment 220,709. The State had (1895) 24 public high schools with 44 teachers and 968 students. Public normal schools numbered 8 with 50 teachers and 1,108 students in secondary grades. These schools are at Concord Church; Fairmount, Farm, Fayetteville, Glenville, Huntington, Shep-

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herdson and West Liberty. At the close of the school year 1901 there were in W. V. 295,695 children of school age, of whom 232,343 were enrolled in public schools and 151,254 were in average daily attendance. There were 32 public high schools, with 87 teachers and 1,871 students, 15 private secondary schools, with 76 teachers and 1,219 students, 7 public and 2 private normal schools, 3 colleges for men and for both sexes, and 2 for the higher education of women. Following are the schools for the defective and delinquent classes: W. V. Schools for the Deaf and Blind, Romney, and W. V. Reform School, Pruntytown. There is a hospital for the insane at Weston.

Illiteracy.—Persons 10 years old and upward enumerated (1880) 428,587, unable to read 52,041, unable to write 85,376, whites unable to write 75,237; colored persons 10 years old and upward 18,446, unable to write 10,139. In 1890 W. Va. had 549,538 population 10 years of age and over, of whom 79,180, or 14.4 per cent., were illiterate; males 281,576, illiterate 37,579, or 13.3 per cent.; females 267,962, illiterate 41,601, or 15.5 per cent. White population 10 years of age and over 524,801, illiterate 68,188, or 13.0 per cent.; native white 506,434, illiterate 65,420, or 12.9 per cent.; foreign white 18,367, illiterate 2,768, or 15.1 per cent. Colored population 10 years of age and over 24,737, illiterate 10,992, or 44.4 per cent.

Finances and Banking.—W. Va. has no bonded debt, and the floating debt of \$101,170 due to the school fund on temporary loans was repaid in 1892. The estimates for 1893-4 showed a decrease in expenditures, and a revaluation of real estate, having increased taxable values by \$25,000,000, warranted a reduction in the rate of taxation for 1893 from 25 cts. per \$100 to 20. The estimated state expenditures for the year ending 1893, Sep. 30, aggregate \$763,749. In 1902 the state had no debt. The assessed valuations were: real estate \$147,784,852; personal property \$65,983,459; railroad property \$25,707,837—total \$239,476,148. The national banks (1902, June 30) numbered 48, with \$4,041,699 capital and \$1,227,182 surplus; 106 state banks, with \$3,961,323 cap., \$1,277,629 surp.; 5 private banks, with \$40,000 cap. and \$9,440 surp.; and 7 loan and trust cos., with \$621,800 cap. and \$7,869—tl. cap. of all banks \$8,674,822, surp. \$2,472,060.

History.—W. V. owes its existence as a state to the civil war; and the first step in the direction of statehood was taken 1861, May 13, when delegates from 25 w. counties held a convention in Wheeling, and adopted resolutions opposing the ordinance of secession which had been passed by the Va. legislature. The loyalists gathered strength, and June 11 a second convention was held by delegates from 39 counties, who undertook to establish a provisional govt. A third convention, in Aug., ordered a popular election to decide the question of statehood in Oct., and in accordance with a practically unanimous desire a constitutional convention was held in Nov., and the constitution then drafted was ratified by the people 1862, May 13. The

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state was admitted into the Union 1863, June 20. During the remainder of the civil war the state contributed 26,540 men to the Union armies. The cap. was at Wheeling 1863-70 and 1875-84, and at Charleston 1870-75 and since 1884.

Government.—The executive authority is vested by the constitution (1862, amended 1872) in a gov., elected for 4 years and ineligible for a second consecutive term, salary \$2,700 per annum; and a sec. of state \$1,000, treas. \$1,400, auditor \$2,000, supt. of free schools \$1,500, and atty. gen. \$1,300—all elected by the people at the same time and for the same term as the gov.—The legislative authority is vested in a general assembly, comprising (1897) a senate of 26 members, elected for 4 years, and a house of representatives of 69 members, elected for 2 years, salary of each \$4 per day and 10 cts. mileage. The legislature meets biennially, in odd-numbered years, and sessions are limited to 45 days. Each branch of the legislature elects its own presiding officer, who receives mileage and \$6 per day during the session. Every male person 21 years old who is a citizen of the United States and has been a resident of the state for one year and of the co. 60 days, and is an actual resident of the precinct, is entitled to vote, except paupers, persons of unsound mind, and those convicted of treason, felony, or bribery at elections. The gov., judges, atty. gen., and state senators, to be eligible to their respective offices, must have been citizens of the state for 5 years prior to election or appointment. All principals and seconds in a duel are forever disqualified from holding offices of honor, trust, or profit in the state.—The judicial authority is vested in a supreme court of appeals of 4 judges, elected by the people for 12 years, salary of each \$2,250 per annum; in a circuit court in each of the 9 judicial circuits into which the state is divided, the judges of which are elected for 8 years and receive \$2,000 each per annum; in a co. court of a pres. and 2 justices of the peace in each co., the pres. elected for 4 years; and in specific corporation courts and the usual subordinate officials. There are also sessions of the U. S. courts at Charleston, Clarksburg, Parkersburg, and Wheeling.—1890, Dec. 13, there were in W. V. 1,614 post-offices, of which 1 was first-class, 3 second, 17 third, 21 presidential, 1,593 fourth class, 81 money-order, and 7 postal-note offices.

The successive gov., with their terms of service, are as follows: Arthur J. Boreman 1863-69; William E. Stevenson 1869-71; John J. Jacob 1871-77; Henry M. Mathews 1877-81; Jacob B. Jackson 1881-85; E. Willis Wilson 1885-90; A. B. Fleming 1890-93; William A. McCorkle 1893-97; G. W. Atkinson 1897-1901; A. B. White 1901-.

Counties, Cities, and Towns.—W. V. is divided into 55 counties. In 1880 the most populous *counties* were: Ohio 37,457; Kanawha 32,466; Wood 25,006; Mason 22,293; Harrison 20,181; Preston 19,091; Marshall 18,840; Berkeley 17,380; Marion 17,198; Jackson 16,312; Greenbrier 15,060; and Jefferson 15,005; and *cities and towns*: Wheeling 30,737; Parkersburg 6,582; Martinsburg 6,335; Charleston 4,192; Huntington 3,174; Grafton 3,030; Clarksburg

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2,307; Charlestown 2,016; Wellsburg 1,815; and Moundsville 1,774. In 1900 the leading *counties* were: Kanawha 54,694; Ohio 48,024; Wood 34,452; Mason 24,142; Harrison 27,690; Marshall 26,444; Marion 32,430; Preston 22,727; Cabell 29,251; Greenbrier 20,683; and Fayette 31,987; and *cities and towns*: Wheeling 38,878; Huntington, 11,923; Parkersburg 11,703; Martinsburg 7,564; Charleston 11,099; Grafton 5,650; Clarksburg 4,050; Benwood 4,511; Moundsville 5,362; Fairmont 5,655; and Hinton 3,763.

Politics.—State elections are held on second Tuesday in Oct.; congress and pres. on Tuesday after first Monday in Nov. The state govt. (1903) was republican in executive and democratic in judicial officers, excepting one, and republican in the legislature, with a party majority in the latter of 18 in the senate, 28 in the house, 46 on joint ballot. W. V. had 6 electoral votes under the apportionment on the 1880 census, and no change was made in the 1890 apportionment. For the presid'l vote, see PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

Population.—(1870) white 424,033, colored 17,980—total 442,014; (1880) white 592,537, colored 25,920—total 618,457; (1890) 762,767; (1900) 958,800.

WET, a. *wët* [AS. *wæt*; Dan. *vaad*; Icel. *vátr*; Sw. *wat*, wet (see also WATER)]: humid; damp; moist; having the pores saturated with water; rainy, as *wet* weather; drenched; in *slang*, tipsy: N. moisture; humidity; rain: V. to moisten; to sprinkle with water; to saturate with water. WETTING, imp.: N. a being saturated or moistened with water. WET, or WETTED, pt. and pp. *wët* or *wët'téd*. WET'NESS, n. *-nës*, moisture; humidity; a watery or moist state of the atmosphere. WET'TISH, a. *-tish*, somewhat wet; moist. WET-DOCK, a dock or large basin of water capable of receiving and floating vessels at all states of the tide. WET'-NURSE, a nurse who suckles a child born of another woman. WET'-SHOD, a. wet over the shoes.

WETHER, n. *wèth'ér*, or WEDDER, n. *wéd'dér* [AS. *wether*; Dan. *vædder*; Ger. *widder*, a wether]: a male sheep castrated when a lamb; a castrated ram.

WETHERELL, EMMA (ABBOTT): soprano opera-singer: 1849, Dec. 9—1891, Jan. 5; b. Chicago, Ill. She first sang in public at the age of 9. Through the patronage and friendship of Clara Louise Kellogg she was enabled to go to New York 1870, where she was engaged in the choir of the Church of the Divine Paternity, a number of whose members 1872 contributed to send her abroad, and she studied for four years in Paris. She made her *début* in London 1876, as *Marguerite*. For refusing to take the part of *Violetta*, in *La Traviata*, on moral grounds, her engagement was cancelled. In 1874 she was married to Eugene Wetherell. She made her first appearance in New York 1877.

WETSTEIN, *wët'stîn*, Ger. *vët'stîn* (or WETTSTEIN), JOHANN JAKOB: noted Swiss biblical critic: 1693, Mar. 5—1754, Mar. 9; b. Basel; of a family illustrious for talents and learning. His father, John Rudolph W. (1647–1711), was

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a prof. of theology and was favorably known as an early editor of Origen: his grandfather, John Rudolph W. the elder (1614-83), also was a prof. of theology, and assisted Suicer in drawing up his *Thesaurus Ecclesiasticus*. After a thorough study of the classics, Hebrew, philosophy, and mathematics, W. was made PH.D. at the age of 16. Four years later he became a minister, and applied himself to the critical study of the New Test. text. In 1717 he began to teach theology at the Univ. of Basel, and continued until 1730, when (being absurdly charged with Socinianism by reason of his emendation of the Greek text in I Tim. iii. 16) he was forced to leave Switzerland. He sought asylum in Holland, where the Remonstrants appointed him prof. of theology at Amsterdam 1733; and there he died.—W.'s great work is his ed. of the New Test., with prolegomena, a collection of various readings, and Latin notes (2 vols. Amst. 1751-2). Its publication marks an epoch in the history of New Test. criticism: it is affluent in textual illustration, and presents an invaluable array of parallel passages from the classics, the rabbins, and the Fathers. W. exceeded all his predecessors in diligent collation of the MSS. (see BIBLE, THE—*New Testament Text*); and he introduced the mode of designating the uncial MSS. by Roman capitals, and the cursive MSS. by Arabic figures (see CURSIVE: UNCIAL).—Semler reprinted the prolegomena with additions (Halle 1764). William Bowyer printed a text (London 1763) incorporating W.'s preferred readings.

WETTE, DE: see DE WETTE.

WETTER, *vět'tér*, LAKE: after Lake Wener (q.v.), largest lake in Sweden; in Gothland, about 25 m. s.e. of Lake Wener, 300 ft. above the level of the Baltic. It is 370 ft. in greatest depth; 70 m. long, 13 m. in average breadth; 850 sq. m. It receives about 90 small streams, though its waters have only one outlet, the Motala river, flowing e. to the Baltic. The waters are clear and of beautiful green color, and it is surrounded by lofty romantic shores, almost unbroken by bays. It is remarkable for an irregular alternation of risings and fallings, and for an occasional undulation, so rapid and violent as to break its thick winter covering of ice. An intricate chain of small lakes, continued westward by the Göta canal, connects Lake W. with Lake Wener, and thus with the Cattegat. Lake W. contains few islands; the chief is Wisingsö, 7 m. long by 1½ m. broad.

WETTERHORN, *vět'tér-horn* (Peak of Tempests): lofty mountain of the Bernese Oberland, Switzerland; on the e. side of the Grindelwald; about 10 m. s.e. of the Lake of Brienz. From the path by which it is ascended, it rises in one vast precipitous mass of alpine limestone. The three peaks of the W. are respectively 12,149, 12,166, and 12,107 ft. above sea-level.

WETZLAR, *věts'lér*: small town of Rhenish Prussia; on the Lahn; 40 m. n. of Frankfurt-on-the-Main. Part of its old cathedral is said to date from the 11th c. W. is notable as the scene of the *Sorrows of Werther*.—Pop. (1880) 7,428; (1890) 8,144.

WEXFORD.

WEXFORD, *wěks'fěrd*: maritime county of Ireland, prov. of Leinster; bounded n. by the county of Wicklow, e. by the English Channel, s. by the Atlantic, w. by the counties of Waterford, Kilkenny, and Carlow; greatest length n. and s. about 60 m.; greatest breadth e. and w. 34 m.; about 900 sq. m., or 576,588 acres, of which 244,276 are under tillage, 273,884 in pasture, 11,763 in plantations, 42,997 uncultivated, 2,392 in towns, and 3,668 under water. The coast-line of W., from Kilmichael Point to the estuary of the Suir, Waterford Harbor, is irregular, and very dangerous for shipping, and offers no secure harbor. The headland called Carnsore Point is the s.e. extremity of Ireland. Parallel with the n. coast-line is a range of sand-banks; and the s. shores are beset by outlying rocks and islets, frequently fatal to shipping. The greater part of the surface is comparatively level, but with some detached hills. The mountains of the border are much higher, the highest point of the Blackstairs being 2,409 ft., and of Mt. Leinster 2,610 ft. There are a few small lakes. The principal river is the Slaney, entering the sea in Wexford Harbor. In geological structure, W. belongs to the e. clay-slate tract. Granite is found in the s.e. and in some of the detached hills; there are also beds of greenstone. Silver was formerly mined near Clonmines, and galena has been found there. Copper ore is found at Kerlogue, near W., and plumbago and asbestos near Enniscorthy. The climate is said to be singularly temperate, and the district is more suitable for agriculture than the counties of Carlow and Kilkenny, though inferior in fertility. The total acreage under crops 1890 comprised only about two-fifths of the county, oats and barley being the principal crops. The breeds of live stock have been much improved. There are but few and inconsiderable manufactures, and the trade is chiefly in the export of agricultural produce, especially barley; butter, cattle, pigs, poultry, and eggs also are exported in large quantities. W. is divided into ten baronies, and contains 144 parishes and 1,600 townlands. The barony of Forth is remarkable as having preserved, from the 12th c. till recent times, a dialect of English quite peculiar, as well as many usages and social habits. The principal towns are Wexford, Enniscorthy (pop. 1891, 5,648), New Ross (pop. 1891, 5,847), and Gorey (pop. 1891, 2,364). Duncannon is noticeable for its ancient fort and historical associations. The maritime position of W. early exposed it to the incursions of the Danes, to whom the name Wexford, or Weisford, is traced by antiquaries. It was the first landing-place of the English in the invasion (1169), and formed part of the tract granted to them by MacMurrough, the overlord of Leinster. By the marriage of Strongbow with Eva, MacMurrough's daughter, W. came into his hands; and after the partition of his lands among his daughters at his death, W. underwent many changes of masters. During the civil wars after 1641, W. was the scene of frequent contests; and in the more recent insurrection of 1798 it was the theatre of the only formidable conflicts of the peasantry with the regular troops. There are numer-

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ous relics of antiquity, Celtic as well as Anglo-Norman, in almost every part of the county. More than a hundred castles are still traceable, and many ecclesiastical remains, of which the monasteries of Dunbrody, Tintern, Ross, and some others are worthy of the best days of mediæval architecture.—Pop. (1841) 202,033; (1871) 132,666; (1881) 123,854, nearly all Rom. Catholics; (1901) 104,104.

WEXFORD: seaport and parliamentary and municipal burgh of Ireland, cap. of the county of W.; at the mouth of the river Slaney; 74 m. s. of Dublin; with which it communicates by the Wicklow Wexford and Waterford railway. The town is on the s.w. shore of the estuary of the Slaney, which is known as W. Harbor; and extends in two nearly parallel streets. There are two Prot. and three Rom. Cath. churches. Of the latter, two are modern and handsome structures. One of the former, St. Selsker's, is ancient, part of its walls dating from the Eng. invasion (12th c.). There are also a Presb., a Meth., and a Quaker meeting-house; a convent of Franciscan friars, 5 nunneries, a Rom. Cath. college, and national, Christian Brothers', and conventual schools. The only important manufactures are distillation and grinding of grain; the chief industry of the town being in connection with the export trade of the county. The harbor has been much improved in recent years. The principal exports are cattle, provisions, and whisky. The W. fisheries have long been reckoned among the most valuable on the e. coast.—The town is ancient, and was occupied by the Danes as one of their strongest settlements. From the time of the invasion, it became an English stronghold against the native population. During the civil wars of 1641 it was occupied by the confederated Rom. Catholics, but was taken by Cromwell 1644. The insurgents of 1798 also had possession of it for a short time.—Pop. (1871) 12,077; (1881) 12,163; (1891) 11,541.

WEY, *n. wā* [from **WEIGH**]: a unit of weight, varying with different articles; a *wey* of wool was equal to $6\frac{1}{2}$ tods, = 13 stone or 182 lbs.

WEYER'S CAVE, *wī'ērz*: stalactite cave in the n.e. part of Augusta co., Va.; in a s.w. spur of the Blue Ridge Mts.; about 18 m. e.n.e. of Staunton. It ranks next in size and interest to Mammoth Cave, Ky., and Wyandotte Cave, Ind. It was named from Bernard Weyer, who discovered it 1804 while hunting. It contains a number of apartments; the largest, Washington's Hall, 250 ft. long, 90 ft. high, beautifully decorated with stalactites and stalagmites, as are also the other apartments. Near it is Madison's Cave, but smaller and of less interest.

WEYLER, *wā'lēr*, **VALERIANO**: Spanish general; 1836 —————; said to be of Irish extraction. He gained distinction during the Carlist war in Spain, and in the Spanish war against the Moors in Africa. During his service under Valmaseda, during the rebellion of 1868-78, he became notorious for atrocious barbarity. Early in 1896, while he was capt.gen. of Catalonia, he was appointed to take direction of affairs and of the Spanish forces in Cuba. On arriving in Cuba he established the sternest kind of

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martial law, and his course throughout fully justified his repute for brutality. Without having 'pacified' the island, he was recalled 1897, Oct., and was succeeded by Gen. Blanco. In 1902 he was Spanish Minister of War.

WEYMAN, *wā'man*, **STANLEY JOHN**: English novelist: 1855, Aug. 7— ————; b. Ludlow, Shropshire, Eng. He was educated at Shrewsbury School and at Christ Church, Oxford; took his B.A. degree 1877; studied for the bar, and was admitted 1881. *The House of the Wolf*, his first story, appeared 1889, followed by *The New Rector* (1890) and *The Story of Francis Cludde* (1891). In 1893 appeared his famed historical romance *A Gentleman of France*, afterward translated into German, French, and Swedish. Among his works are: *The Man in Black* (1894); *Under the Red Robe* (1894); *My Lady Rotha* (1894); *The Red Cockade* (1895); and *Memoirs of a Minister of France* (1895).

WEYMOUTH, *wā'mūth*: town in Norfolk co., Mass.; on the Old Colony railroad; 12 m. s. of Boston. It is the second oldest settlement in the state, dating from 1626 (see **WESTON**, **THOMAS**); and contains several villages, principally engaged in the manufacture of boots and shoes. There are 16 churches, high school, several graded schools, 1 national bank (cap, \$200,000), 1 savings bank, and 1 weekly newspaper. Pop. (1880) 10,570; (1890) 10,866; (1900) 11,324.

WEYMOUTH-AND-MELCOMBE-REGIS, *wā'mūth-ānd-mēl'kūm-rē'jīs*: seaport, fashionable watering-place, and municipal borough of Dorsetshire, England; on a bend of the coast facing the s.e., and at the mouth of the river Wey: 3 m. n. of the isle of Portland, 8 m. s. of Dorchester by railway, about 145 m. from London. The river separates the two quarters—the old town of Weymouth lying s.; the modern town, Melcombe-Regis, extending n. and facing the sea. These two very ancient towns were united into one borough 1571. The two quarters communicate by a bridge with a swing in the middle, to permit passage of ships. The old town is uninteresting in appearance; Melcombe-Regis, elegantly built, is on a narrow peninsula, with the sea on the e. and the estuary on the w. side. Its chief features are the sea-terrace and esplanade, about a mile long, the latter adorned with a statue of George III., who largely patronized Melcombe. The harbor has 14 ft. of water at full tide, and in the bay there is good anchorage in 7 or 8 fathoms. Steamers sail regularly from W.-and-M. to the Channel Islands, and daily to Portland. Ship-building, rope and sail making, and the export of Portland stone and Roman cement chiefly employ the inhabitants. The port is supposed to have traded with the merchants of old Tyre long before the arrival of the Romans.—Pop. (1871) 13,259; (1881) 13,715; (1891) 13,769.

WHACK, n. *hwăk* [a corruption of *thwack*]: a blow; in *slang*, a large slice: V. to strike. **WHACK'ING**, imp.: ADJ. large; stout; thumping; big. **WHACKED**, pp. *hwăkt*. **WHACK'ER**, n. *-ēr*, *familiarly*, a tremendous falsehood; a whopper.



Greenland or Arctic Right Whale (*Balaena mysticetus*).



Southern Right Whale (*Balaena australis*).



Humpbacked Whale (*Megaptera boops*).



Common Rorqual Whale (*Balænoptera musculus*).

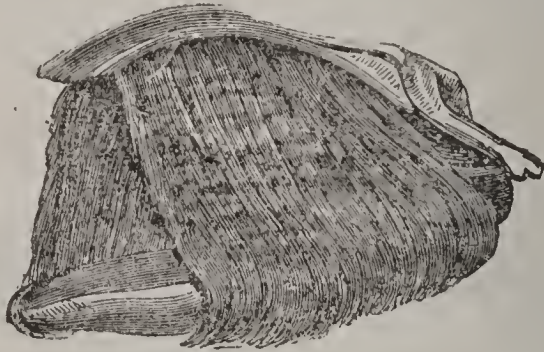


Sperm Whale (*Physeter macrocephalus*).

WHALE.

WHALE, n. *hwāl* [AS. *hwæl*; Icel. *hvalr*; Dan. and Sw. *hval*; Ger. *walfisch*, a whale]: the largest of sea-animals, frequenting high latitudes, and sought for on account of its oil and other commercial products; a large cetacean (see below). WHALING, n. *hwāl'ing*, the business of catching whales: ADJ. pertaining to the catching of whales. WHAL'ER, n. -*ér*, a ship or person employed in the whale-fishery; a long narrow boat used when pursuing and harpooning the whale. WHALEBONE, an elastic horny substance obtained from the upper jaw of the whale (see below). WHALE'S BONE, used for ivory in Shakespeare. WHALE-FIN, n. whalebone.

WHALE: one of the larger cetaceans, particularly one belonging to either of the families *Balænidæ* and *Physeteridæ* or *Catodontidæ*. For the latter family, see CACHALOT: for some of the species of *Delphinidæ*, also sometimes called whales, see the several titles—e.g., CAAING WHALE: BELUGA. In the *Balænidæ* the head is of enormous size, as in the *Catodontidæ*, but is entirely without teeth, instead of



Jaws of Greenland Whale, showing the Baleen.

which the palate is furnished with an apparatus of *baleen* or *whalebone*, for straining out of the water the small crustaceans and aculephs which form the food of these whales. Rudiments of teeth, however—dental pulps—appear in the fetus of the whale—60 or 70 on each side of each jaw; but they are reabsorbed into the system, and the plates of whalebone are produced not from them, but from the integuments.

The fibrous structure of baleen or *whalebone*, its elasticity, and its heaviness, are well known. The plates of it in the mouth of a W. are very numerous, several hundreds on each side of the mouth, and are very closely placed together transversely, so that the edge of each plate is seen in a side-view. They form two rows suspended from the upper jaw (a row on each side of the mouth), connected by short plates in front, where the upper jaw arches down, but very long on the side where the arch is highest. Interiorly, the rows nearly meet where the plates are broadest at the top; and the ends curve outward, hanging down in the cheeks on each side of the lower jaw. Some of the longest plates in full-grown whales are 10 ft. in length. The whole quantity in the mouth of a large W. sometimes amounts to nearly two tons in weight. The base of each plate is imbedded in the substance of the

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membrane that covers the palate; while its edge and end are frayed into loose fringe, composed of fibres or pliant bristles. The vast mouth being opened, water is taken in; and the small animals which enter with it being retained for food, the water is allowed to escape by the sides of the mouth.

The tongue is a soft thick mass, not extending beyond the back of the mouth. The gullet of whales is very narrow; it is said not to be more than $1\frac{1}{2}$ in. in diameter even in a large W., so that only very small animals can pass through it.—The head of whales occupies from a third to a fourth of the whole length. The skull is unsymmetrical, the right side larger than the left. The flesh is red, firm, and coarse. The skin is naked, except for a few bristles about the jaws, and its surface is moistened by an oily fluid. The lower surface of the true skin extends into a thick layer of *blubber*, an open network of fibres in which fat is held. The blubber is from 1 to 2 ft. in thickness, the whole mass in a large W. sometimes weighing more than 30 tons: it serves to keep the animal warm, as well as to make the specific gravity of the whole body much lighter than it would otherwise be, and to resist the pressure of the water in the great depths to which it often descends. The skin of whales is always infested with parasites; mollusks adhere to it; a peculiar barnacle inhabits depressions in the skin; and other crustaceans, such as the Whale-louse (q.v.), attach themselves to it. Attempted calculations of the age of whales (800 or 900 years) from the transverse lines on the plates of baleen are entirely without basis.

In the genus *Balæna* there is no dorsal fin, nor elevation of the back corresponding to it, as in some of the family. The belly is smooth, not plaited, as in the other genera of the family. The most important species, and indeed the most important of all the whales, is known as the GREENLAND W. (*B. mysticetus*): it is known also as the Bowhead or Polar W., and has long been confounded with the true Right whales. It inhabits northern seas, and abounds chiefly in the Arctic regions. It attains a length of 60 or 70 ft. The body is thickest a little behind the *flippers* or pectoral fins, tapering conically toward the tail and slightly toward the head. The tail is 5 or 6 ft. long and 20 to 25 ft. broad, formed of two horizontal diverging lobes. The pectoral fins are 8 or 9 ft. long, and 4 or 5 ft. broad. The mouth is 15 or 16 ft. long. The eyes, which are on the sides of the head, about 12 in. above and rather behind the angles of the mouth, are not larger than those of an ox; but the sense of sight seems acute, at least in the water. The iris is white. The blow-holes are on the most elevated part of the head; they are from 8 to 12 in. long, but of comparatively small breadth. The upper parts of the whale are velvety black, the lower parts white: the upper parts, in very old whales, sometimes become piebald, the black being mixed with white and gray. The period of gestation is uncertain; one young one is produced at a birth—10 to 14 ft. in length when born. The mother shows great affection for her offspring, of which whale-

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fishers sometimes take advantage, harpooning the young one—itsself of little value—to secure the mother. Suckling is performed at the surface of the water, and the mother rolls from side to side, that she and the young one may be able to breathe in turn. The usual rate of progress in swimming is about 4 or 5 m. an hour, and whales often swim not far beneath the surface of the water, with the mouth wide open to take in water from which to sift food.



Greenland or Right Whale (*Balæna mysticetus*).

The W. is capable, however, of swimming with much greater rapidity, and, when harpooned, it often descends to a great depth in a few seconds. Its tail is very powerful, and a single blow of it is sufficient to destroy a large boat, or toss it and its crew into the air; so that the whale-fishery is attended with no little danger, though much diminished since harpoon-guns and bomb-lances came into use. Whales usually come to the surface to breathe at intervals of 8 or 10 minutes, but they are capable of remaining under water half an hour or more. When they come up to breathe, they remain on the surface usually about two minutes, during which they blow 8 or 9 times; and then descend. The noise in blowing is very loud, and the spout of spray ejected ascends several yds. into the air, appearing at a distance like a puff of smoke. The spray is only the moisture mingled with air forced from the lungs. They often assume, as if in sport, a vertical position, with the head down, and flap the surface of the water with the tail, making a sound audible two or three m. off. The Greenland W. is not properly gregarious, being generally found alone or in pairs, except when numbers are attracted to particular feeding-grounds, as is sometimes the case in the bays and inlets of n. coasts.

It was formerly supposed that the Greenland W. was an inhabitant of the s. as well as of the n. parts of the world; but the SOUTHERN or CAPE W. (*Eubalæna australis*) has the head smaller in proportion than that of its n. congener,

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and the color a uniform black. It belongs among the true Right whales, and attains the length of 50 or 60 ft. It is found usually in comparatively shallow water near coasts. It occurs, according to Murray, in the s. Atlantic, s. Pacific, and the Indian oceans. Its capture has been prosecuted to a considerable extent on the coasts of s. Africa and New Zealand, though this whale-fishery has never been so important as that of the n. seas. *E. antipodarum* is a species described by Gray, from New Zealand.

Of the Right whales proper zoologists have not yet determined the number of species, nor their limits of distribution. The Right W. of the n. Atlantic (*Eubalæna cisarctica*, Cope), nearly related to the *E. biscayensis* of the e. Atlantic, was formerly abundant on the New England coast; one was killed 1867 in Cape Cod Bay, 48 ft. long, yielding 84 barrels of oil and 1,000 lbs. of baleen. It occurs as far s. as the Bermudas. The Pacific Right W. (*E. cullamach*), the Northwest W. of the whalers, is found from the Arctic to Cal. and perhaps Japan.

The species of the genus *Megaptera* are called HUMP-BACKED WHALES, and by whale-fishers ordinarily *Hump-backs*. They have a rudimentary dorsal fin, in the form of an elevation of the back. There are several species, but some are very imperfectly known. *M. longimana*, so called from the length of the pectoral fins, is found in the North Sea, and is included in the British fauna. *M. Americana*, the BERMUDA HUMP-BACKED W., occurs chiefly about the Bermudas, from which its baleen is extensively imported. Another species, *M. Pæskop*, occurs at the Cape of Good Hope. Whatever may be the validity of these species, our Atlantic species is determined as *M. osphya*, and in 1879 was abundant on the coast of Me., though of late years rare. Our Pacific coast species (*M. versabilis*) has been observed from Cal. to Peru, migrating in large numbers. The Hump-backs are 25 to 75 ft. in length, average 40 barrels of oil, and have baleen 2-3 ft. in length.

The genus *Balænoptera*, *Physalus*, or *Rorqualus* is distinguished by having a dorsal fin; see RORQUAL. All the species of these genera are objects of pursuit to whale-fishers, though the Greenland W. is preferred.

Important as the W. is to civilized man, both for the oil and for the whalebone which it yields, it is still more important to the rude natives of arctic regions, as the Esquimaux and Greenlanders, who use its oil for food as well as for burning, and to whom its flesh also is a chief article of food; while its bones and baleen are used for making tents, sledges, boats, harpoons, and spears; the sinews supply a substitute for twine or thread; and the membranes are used instead of glass for windows. There is no essential difference in the way in which the capture of whales is prosecuted by the rudest tribes and the most civilized nations. The whale-fishers approach the whale in boats, and attack it by harpoons to which lines are affixed, following up and repeating the attack until its strength is exhausted, taking advantage of the necessity which it experiences of coming at intervals to the surface to breathe, and

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finally killing it with lances, thrust into the most vital parts.

In its most simple form, the harpoon is an iron spear about 5 ft. in length, with a much-flattened point, having sharp cutting edges and two large flattened barbs. Many modifications have been made, the most important perhaps being the gun-harpoon. The ordinary harpoons are attached to a long line at the opposite end to the barbed point, and when the boat is near enough to the W., the



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man whose duty it is darts or plunges the weapon with all his force into the animal's side. In its fleeing from the attack, the line is rapidly drawn out of the boat, until the creature is tired, and rises to the surface for air. The boat follows, keeping as much of the line as possible, until, exhausted by pain and loss of blood, the animal succumbs. It will be seen that much depends on the sharpness of the blade-like edges of the barbs, and their power to hold when in; hence many ingenious devices of movable barbs have been contrived, which close on the shaft of the instrument in going into the animal's flesh, but open outward as soon as there is any strain on the shaft. The gun-harpoon is a short bar of iron with the barbed spear at the end, and a ring with chain for the attachment of the line; this is fired from a small swivel-cannon attached to the whaler's boat. However well the harpoon may be fixed in the animal's body, its death and capture are still very difficult to accomplish, and take much time. To obviate this, an ingenious expedient suggested by Sir R. Christison, toxicologist of Edinburgh Univ., was to place glass tubes containing prussic acid in the shaft of the harpoon, so that, the moment the cord or line was pulled tight, they would be broken in the animal's body, and occasion instant death. This plan has been tried with great success; but has met opposition from the whale-fishers, who have a prejudice against using a poison which they see has such deadly effects; for a whale thus dealt with disappears for only about five minutes, and then rises to the surface dead. Strychnia has been used instead of prussic acid, and with similar results. The lance used for killing the W. has generally a blade 5 or 6 in. long and $2\frac{1}{2}$ or 3 in. broad, with sharp cutting edges and a long wooden handle. The bomb-lance, producing an explosion inside of the body of the W., is much used.

The ships fitted out for the northern whale-fishery, now frequently screw steam-vessels, are protected from injury by ice by being fortified with an additional series of planks, iron plates, and a *false* or *ice* stem, on the sides of which are *ice-knees*—angular blocks of wood filling up the con-

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cavity formed by the stem and fore-planks. The stern also is defended by *ice-plates* of half-inch iron; and many timbers and stanchions are added in the interior of the vessel, great strength being more important than fast sailing. Each ship has generally 6 or 7 boats, 23 to 28 ft. in length, each capable of carrying 6 or 7 men, with 7 or 8 cwt. of whale-lines, etc. The crew of a whaler consists of 40 or 50 men, each of whom, from the master to the boys, generally receives, in addition to his fixed wage, a gratuity for every W. caught, and a certain sum for every ton of oil produced by the cargo. Each boat carries 2 harpoons and 6 or 8 lances. When the ship arrives in the vicinity of a whaling-ground, a lookout is stationed at the mast-head. As soon as a W. is discovered, the boats are lowered, and a competition ensues among their crews, all exerting their utmost strength to reach the W. first. The harpooner is ready, as soon as the boat is sufficiently near the W., to hurl or fire his harpoon; the crew instantly back the boat, and the W. generally plunges in terror to a great depth, sometimes carrying out more than 200 fathoms of line. It remains below for 20 minutes or more, and when it rises, the boats hasten to it again; it is struck with a second harpoon, and probably, instead of at once descending, it strikes violently with its tail, to destroy its enemies: at such a time great caution is requisite. It cannot now remain long below the surface, and when it comes up probably spouts blood through the blow-holes. When it is lanced, it sometimes dies almost at once, but sometimes there is a terrific struggle—the water is lashed into foam, and dyed with blood. It frequently happens that, instead of dying at the surface of the water, the W. descends, and does not rise again, so that it is lost to the whaler. The carcass of the W. is towed by the boats to the ship, and made fast to the ship's chains. The process of *flensing* is then commenced. Some of the crew, having their boots armed with iron spikes, to prevent them from slipping, descend upon the carcass, and cut into the blubber with *blubber spades*, removing a broad strip or *blanket* of skin, 20 or 30 ft. long, which is hoisted to the deck by means of a hook and tackle. Great cubical pieces of blubber, of half a ton or a ton in weight, are then cut out and hoisted on deck. In this way the process is carried on, the W. being turned over and over, that every part may be reached; till, in three or four hours, the whole mass of blubber is removed from it—probably amounting to 20 or 30 tons. Meanwhile others of the crew have descended into the mouth of the W., and removed the baleen. The remainder of the carcass is then flung adrift, and sometimes sinks, but often floats, in consequence of incipient putrefaction, and affords food for bears and fishes. The blubber, after being received on deck, is cut into smaller cubical pieces, and subjected at leisure to a process by which the cellular tissue is separated from it. This is called *making-off* or *trying-out*; and to accomplish it, the blubber is heated in a large pot, and afterward strained, the scraps or cracknels from one pot serving as fuel for

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another. The product is finally stored in casks, to be conveyed to port and boiled for oil. A ton of blubber yields nearly 200 gals. of oil: see SPERMACEI. A single W. often yields blubber and whalebone to the value of \$3,500 or \$4,000. The whalebone is subjected to no process but that of drying till it is brought home. Ships often return from the whale-fishery *clean*—i.e., without having captured one whale.

The Norwegians sent vessels to Greenland for the whale-fishery in the 9th c. They had previously prosecuted it on their own coasts, and the Norman settlers on the Bay of Biscay carried it on there. Whales then inhabited that bay in considerable numbers, till, through the eager prosecution of the fishery, they became so few that about the 15th c. the fishery became unprofitable and was relinquished. In 1261 a tithe was laid on the tongues of whales brought into Bayonne, the tongues being then esteemed for food. The French, Spaniards, and Flemings early began to fit out vessels for the n. whale-fishery; the English entered on it with great spirit in the end of the 16th c., and about the same time the Dutch, Danes, and Hamburgers. The British Muscovy Company obtained a royal charter giving them a monopoly of the whale-fishery of the coasts of Spitzbergen, on the pretense of its having been discovered by Sir Hugh Willoughby, though, in fact, it was discovered by the Dutch navigator Barentz. Other nations were not disposed to acknowledge the claims of the English; the Dutch in particular sent out a strong fleet, between which and the ships of the Muscovy Company an engagement took place 1618, and the English were defeated. The Spitzbergen bays and seas were afterward divided into fishing-stations, allocated to the whalers of the rival nations. No nation now asserts a claim to the exclusive right of whale-fishing in any quarter. The Spitzbergen fishery was thrown open to all nations 1642.

The United States in the 19th c. has been more actively engaged in the whale-fishery than any other nation. The New England colonies entered on this enterprise at a very early period, at first merely by boats on their own coasts, which, however, were deserted by whales before the middle of the 18th c.; and then began the fitting out of ships for the n. seas. For a number of years the whale-fishery has been declining, because of the scarcity of whales, also because substitutes for whale-oil and whalebone have been found. New Bedford, Mass., has long been the greatest whaling-port in the world; but its ships, now comparatively few, refit at San Francisco or the Sandwich Islands for the most part, and send much of their catch across the continent. The decline in the fishery began 1854, and was especially marked during the civil war (1861–65). In 1880 the n. Pacific Arctic whaling-fleet comprised 20 vessels; and the season's catch was 23,200 bbls. of oil, 339 000 lbs. of bone, and 15,300 lbs. of ivory. In 1890 there were 44 vessels in the fleet; and their catch was 14,885 bbls. of oil, 241,360 lbs. of bone, and 4,000 lbs. of ivory. The most successful year since 1874 was 1887, when 41 vessels

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had a catch of 32,884 bbls. of oil and 603,400 lbs. of bone; the largest amount of ivory, 80,000 lbs., was secured 1878.

A curious old law in England is that whales belong to the crown if they are caught or found within the territorial sea—that is, within the limit of 3 m. from the shore; or in the inner seas, as distinguished from the open sea. Whales are thus called royal fish; and it is said sturgeons and porpoises also are in the same class. If the whales are not caught in the territorial seas, which are part of the realm, but in the open sea, then the law of nature applies, or rather a secondary law or custom governs the right of property; and that law, though varying slightly according to locality, is, that the person who first captures the W. is entitled to keep it. In the Greenland seas the local custom is, that the first harpooner who strikes the W. is entitled to the property only if he continue to hold the W. by the line attached to his harpoon; but if his line break, and a subsequent harpooner from another ship finish the capture by obtaining possession, then the latter is entitled, for it is a loose creature. This rule, however, has been qualified in this way, that the first harpooner who strikes the W. and keeps it entangled is entitled to it even though a volunteer come up and officiously strike the same W., thereby causing it to struggle and break from the first line. At Gallipagos, S. America, the custom is, that he who first strikes the W. with a drong, or loose harpoon, is entitled to receive half of it.

WHALEBACK VESSELS—WHALEBONE.

WHALEBACK VESSELS: vessels having the main decks covered in and rounded over, the hull thus presenting a form roughly resembling the back of a whale; for use in rough water, the waves passing completely over them without resistance or injury. Sometimes they have upper works. The first craft of this kind was built for a Baltimore company about 1860, with a view of shortening the transatlantic passage, but it proved a complete failure. Another was built 1878, to convey to America the Egyptian obelisk known as Cleopatra's Needle; it had no motive-power, but was towed by a steamer. It was abandoned during a heavy gale in the Bay of Biscay, but remained afloat seaworthily, and was eventually brought to port with the obelisk uninjured. In 1888 Alexander McDougall, shipmaster of Duluth, Minn., built a barge of 437 tons registry and 1,400 tons capacity. Its cost was \$45,000, yet it is stated that within two years she netted her owner nearly twice that amount. A company, founded by McDougall, at once placed on the great lakes a fleet of whalebacks, with total capacity of 70,000 tons. Most of these were self-propelling steamers, but some were for towage only, all being of steel. Such vessels are used mainly as grain-carriers, but the *Christopher Columbus* (abt. 3,000 tons) was in satisfactory service during the Columbian Exposition in carrying passengers between Chicago and the exposition grounds. Later she plied as a passenger-steamer between Chicago and Milwaukee; average speed, nearly 20 m. per hour.

WHALEBONE: the baleen plates which take the place of teeth in the mouths of the Baleen Whales (see **WHALE**). They form an important article of commerce, and vary in length from a few inches to 10 ft., and in rare instances to 12 ft. Their chemical constitution is albumen hardened by a small proportion of phosphate of lime. Their color is usually bluish black, but in some species they are striped longitudinally with bands of a whitish color; and they terminate at the point in a number of coarse black fibres of the baleen, which fibres are found also more or less down both sides of the blade. These fibres are much used by brush-makers. W. was formerly in demand for the so-called 'hair-cloth' of upholstery, and for crinoline skirts. For corset-stays, better substitutes have been invented; also for umbrella-ribs. There are three principal kinds in the foreign market, and they are generally known as *whale-fins*. The first are the *Greenland* or Davis' Strait and North Sea fins; second, the South Sea or black-fish fins; third, the Northwest coast or American whale-fins. Whalebone requires some preparation before being fit for use; this, however, is very simple. It is first trimmed—that is, all the hairs are removed from the point and edges of each blade; and usually the surface of each flat side is scraped. The blades are then boiled in water for several hours, until they become soft enough to be cut easily with a common knife. The workman then cuts them into lengths fitted for the purposes to which they are to be applied. They are used chiefly in thin strips, and can be easily split, owing to their lamellar structure. Generally the boiling is com-

WHALE-LOUSE-WHANG-HAI.

bined with a dyeing process, to make the whalebone perfectly black, which is preferred to the natural color.— Strips of rattan canes dyed black are used as a cheap kind of artificial whalebone, but the best imitation is made of vulcanite or prepared caoutchouc, which in many respects is superior to the real whalebone. In the year ending 1891, June 30, the United States exported 159,322 lbs. of bone, value \$717,230. In the imports and exports of oil (excepting export of sperm, 62,552 gals., value \$46,866) there was no official separation of whale-oil from 'other fish-oil.'—See WHALE.

WHALE-LOUSE: any small parasite infesting the whale; specifically a crustacean of the genus *Cyamus*, order *Læmodipoda*, having the body short and rather broad; the legs short and stout; seven pairs of legs; the 1st pair more slender than the rest; the 1st, 2d, 5th, 6th, and 7th pairs furnished with sharp hooked claws, the 3d and 4th terminating not in claws, but in a long, almost cylindrical joint. All the species of *Cyamus* are parasitic on Cetacea, attaching themselves to the skin by their claws. Whales are sometimes so completely covered with them as to appear of whitish color even at a distance; and when the whale is captured, its skin is found to be deprived of the epidermis. *Cyamus Ceti* is said to infest also the mackerel and other fishes of the family *Scomberidæ*.

WHALLEY, *hwǎl' lǐ*, EDWARD: English regicide: about 1620—about 1678; b. England. At the beginning of the revolution of 1642 he was a merchant. He joined the parliamentary party, though his family were royalists, and entered its army. For bravery at Naseby 1645, parliament made him a col. He was in command of the horse at Bristol, Banbury, and other places, and was intrusted with the charge of the king's person at Hampton Court. At Dunbar, with Gen. George Monk, he commanded the infantry. W. was a member of the high court of justice that tried King Charles I., and signed his death-warrant; a member of Cromwell's 2d and 3rd parliaments, and later sat in his house of lords. As maj.gen., he governed five counties in England. At the restoration, with his son-in-law William Goffe, he fled to this country, and after 1664 lived at Hadley, Mass., where he died.

WHAME, n. *hwām*: the horse-fly; the gad-fly or cleg; an insect of the family *Tabanidæ* (q.v.).

WHANG, n. *hwǎng* [AS. *thwang*, a leather string: a form of *thong*]: a strap or strip of leather; in *Scot.* and *prov. Eng.*, a large piece, as a *whang* of cheese: V. in *prov. Eng.*, to beat.

WHANGEE': see WANGHEE.

WHANG-HAI, or HWANG-HAI, *hwǎng-hǐ'*, or YEL'LOW SEA (sometimes spelled HOANG-HAI, *hwǎng-hǐ'*): that portion of the Pacific Ocean which washes the n. part of the e. coast of China; bounded w. by the provinces of Shang-tung and Keang-su, e. by the peninsula of the Corea and by Japan. It terminates on the n.w. in the Gulfs of Pechih-li and Leao-tong, and opens out in the s.e. into the

WHAP—WHARF.

Tung-hai or **Eastern Sea**. It is more than 600 m. long, and over 400 m. in average breadth. The W.-H. is shallow, and near the land its waters are of a lemon color, owing to the nature of the bottom, which is often furrowed by vessels navigating it. It is fast becoming more and more shallow, owing to the quantity of alluvium borne down into it by the rivers Hwang-ho (q.v.) and Yang-tse (q.v.).

WHAP, or **WHOP**, v. *hwōp* [W. *chwap*, a sudden stroke]: to beat; to flutter; to strike: N. a blow. **WHAPPER**, or **WHOPPER**, n. *hwōp'pēr*, in *slang*, a monstrous or barefaced lie. **WHAP'PING**, or **WHOP'PING**, a. *-ping*, inordinately large.

WHARF, n. *hwawrf* [AS. *hwerf*, a dam erected to keep out water—from *hweorfan*, to turn about: Dut. *'werf*; Dan. *værft*, a wharf]: a bank or platform of stone, wood, or metal, formed on the shore of a harbor, river, or canal, for convenience of lading and unlading ships; a quay; a pier; in *OE.*, a bank or shore. **WHARFS**, *hwawrfs*, or **WHARVES**, *hwawrez*, n. plu. **WHARF'AGE**, n. *-āj*, the dues paid for the use of a wharf. **WHARF'ING**, n. wharfs in general. **WHARF'INGER**, n. *-in-jēr*, one who has the charge of a wharf; the proprietor of a wharf. A wharfinger is by law responsible in much the same way and to the same extent as a Warehouseman (q.v.). He is required to take ordinary care of the goods intrusted to him, but is not, like an inn-keeper or carrier, an insurer. His responsibility begins when the goods are placed in his custody, and ends when he ceases to have such custody.

WHARF, in Law: an erection extending out from a shore, or parallel to but connected with it, for convenience in embarking and disembarking goods, passengers, etc., from vessels. In the absence of legislation on the subject by the general govt., the several states, as the owners (with some exceptions) of the soil of tide-waters within their respective territories, have the right to authorize and regulate erection of wharves, and to grant exclusive rights to municipal corporations, etc. In Maine and Mass. the shores and flats for 100 rods belong to the owner of the upland, and he may wharf out that distance, subject to the rights of the public, but cannot extend beyond that without legislative sanction. In Conn. and Penn. the owner of the upland has somewhat similiar rights: in Conn. he may wharf out to the channel, subject to public rights, and in Penn. to low-water mark; but private persons who go upon or fasten their vessels to such wharves are not considered trespassers. In navigable fresh-water rivers, the riparian proprietors, being the owners of the bed of the stream, may wharf out to the channel, but in doing so must not obstruct or interrupt navigation.—In the United Kingdom the soil of all tide-waters below high-water mark is vested in the crown as the conservator of public rights, and no wharf can be erected without the consent of the crown. Any wharf which interferes with navigation to such an extent as to be a public detriment can be maintained only by sanction of parliament.

WHARNCLIFFE MEETING—WHARTON.

WHARNCLIFFE MEETING, *hwaworn'klif*: in Great Britain, a meeting of the stockholders of a corporation held in conformity with a standing order of the house of lords styled the 'Wharncliffe Order,' because proposed by Lord Wharncliffe. This order provides that no bill to empower any company, already constituted by act of parliament, to execute, undertake, or contribute toward any work other than that for which such company was originally established, or to sell, lease, or abandon its undertaking, or any part thereof, or to amalgamate with any other undertaking, or to dissolve, is allowed to proceed in the house of lords until it is reported that such bill has been submitted to a special meeting of the proprietors of the company, convened by public advertisement, and by circular addressed to each proprietor; that such meeting was held not earlier than seven days after the last insertion of such advertisement; and that at such meeting the bill was submitted to the proprietors present, and approved of by proprietors present, in person or by proxy, holding at least three-fourths of the paid-up capital of the company represented at such meeting. The house of commons has adopted a corresponding standing order applicable to such bills coming from the lords.

WHARTON, *hwawor'ton*, FRANCIS, D.D., LL.D.: author of law-books: 1820, Mar. 7—1889, Feb. 21; b. Philadelphia. After graduation at Yale 1839, he practiced law in Philadelphia 15 years. He was asst. atty.gen. of Penn. 1845; and prof. of logic and rhet. in Kenyon Coll., O., 1856-63. After ordination in the Prot. Episc. Church 1863, he was rector in Brookline, Mass., and prof. of eccles. and international law in Cambridge Divinity School and Boston Univ. Beginning 1885, he was U. S. examiner of international claims, and from 1888 editor of diplomatic correspondence during the revolution. He died in Washington. His publications include treatises on *Criminal Law* (1846); the *State Trials of the U. S.* under Washington and Adams (1849); *Precedents of Indictments and Pleas* (1849); the *Law of Homicide*, also *Medical Jurisprudence* (1855); *Theism and Modern Scepticism* (1859); the *Silence of Scripture* (1867); a *Reminiscence of Gambier* (1868); the *Conflict of Laws, or Private International Law*, with historic review (1872); the *Law of Negligence* (1874); the *Law of Agency and Agents* (1876); the *Law of Evidence in Civil Issues* (1877); the *Law of Contracts* (1882); *Commentaries on Law* (1884); and a *Digest of International Law*, 4 vols. (1886-).

WHAR'TON (PHILIP WHARTON), Duke of: 1699-1731, May 31; son of Thomas, Marquis of W., eminent member of the whig party in Queen Anne's reign, and lord-lieut. of Ireland from 1708 until after the fall of the Godolphin administration 1710. Macaulay represents the marquis as licentious and corrupt; but the faults of his Irish administration were to some extent redeemed by his appointment of Addison as chief-sec. Philip (his son) succeeded to the title and fortune at the age of 16, and went abroad with a French Huguenot tutor, to be brought up according to his father's dying instructions,

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in strict Presbyterian principles, at Geneva. He contracted debts, spurned the restraints of his tutor, and ran away to Lyon. He visited the Pretender at Avignon, and, it is said, accepted from him the title of Duke of Northumberland. He went to Ireland, where, though he had not reached his 19th year, he was allowed to take his seat in the house of peers. He soon displayed such splendid abilities in debate, and supported the government with so much zeal, that, though still under age, he was raised (1718) to the highest rank in the English peerage. W. took his seat in the English house of peers 1720. His affairs became hopelessly involved by his extravagance, so that, although he had succeeded to an estate of £16,000 a year, he was soon compelled to accept a yearly allowance of £1,200 from his creditors. He set up a political paper, called the *True Briton*, 1723; and lost no occasion of speaking and writing against the ministry and the court. After 1724 he went to Rome, and appeared openly at the court of the old Pretender, from whom he accepted the order of the Garter. He now assumed the title Duke of Northumberland. In 1727 he fought for the Spaniards and against his countrymen at the siege of Gibraltar: this lost him his English title and estates, and led to his conviction under a bill of indictment for high treason. The rest of his life was passed in France and Spain, at one time squandering his precarious supplies of money in drunkenness and luxury, at another suffering the extremest poverty. He died in a miserable condition at a Bernardine convent in Catalonia. His brilliant talents and wasted life were sketched by Pope in his *Moral Essays*, in the lines beginning—

Wharton, the scorn and wonder of our days.

The *Life and Writings of Philip, Late Duke of Wharton*, were published in 1732 (Lond. 2 vols. 8vo).

WHARTON, SAMUEL: merchant: 1732, May 3—1800, Mar.; b. Philadelphia; cousin of Thomas W. He was one of the firm of Baynton Wharton & Morgan, and was sent to England on business for his house, and had nearly completed the negotiations for it when some of his correspondence with Franklin was discovered, and he was obliged to fly from the country. He went to France, where he was soon joined by Franklin; and he returned to Philadelphia 1780. He was a member of the city councils; of the committee of safety of the revolution; a member of the Penn. colonial and later of the state legislature; served in the continental congress 1782–3; and was a member of the Ohio company for forming a settlement on the Ohio river. He died in Philadelphia.

WHARTON, THOMAS: merchant: 1735–1778, May 22; b. Chester co., Penn.; grandson of Thomas W., of Westmoreland, England, who was founder of the Wharton family in Philadelphia. When trouble between the crown and the colonies arose, he at once espoused the cause of the colonies, and was one of the first to sign the non-importation resolutions of 1765. At the closing of Boston Harbor he was chosen a member of the committee of correspon-

dence, was a deputy to the convention called by the citizens of Philadelphia to meet 1774, July 15, and one of the committee of safety of the revolution. In 1776, July 24, he was made president of the council of safety, in which the executive authority was temporarily placed. In 1777 he was elected pres. of Pennsylvania, with the title 'His excellency Thomas Wharton, junior, esquire, president of the supreme executive council of Pennsylvania, captain-general, and commander-in-chief in and over the same.' He held this office until his death. On the British occupation of Philadelphia, he with the executive council removed to Lancaster, where he died and was buried with military honors.

WHAT; interrog. and compound rel. pron., sometimes used adjectively, *hwōt* [AS. *hwæt*, which, what, neut. of *hwa*, who (see also WHO)]: as a relative pronoun *what* is equal to that which; the thing that; the sort or kind of thing, as, I will stand by *what* I have said—i.e., by *that which* I have said. It refers to singular and neuter antecedents, and is used both substantively and adjectively. *What* was formerly and still is vulgarly used for *that* or *which*, as, if I had a donkey *what* wouldn't go (for examples see Shak., *Hen. VI.*, vi. 1, and *T. of A.*, iv. 2). As an interrogative *what* inquires as to the name, nature, quality, state, etc., of things, 'as, *what* have you done? *what* is the matter?—i.e., state the name, nature, or particular kind of thing you have done, etc. As applied to persons, it is sometimes equal to *who*, as, *what* is this man? Though originally the neuter of 'who,' *what* is now used adjectively without respect to gender. *What* is used also as an exclamatory word by way of surprise or question, meaning, how great, how remarkable, and the like, as, *what* beauty! *what* grandeur! It is also used for *partly* or *in part*, as, *what* with war, *what* with poverty; indicating something indefinite in the mind of the speaker, as, I tell thee *what*, I know not *what*. WHAT NOT, an indefinite enumerative phrase nearly equal to 'what you will,' some other thing or things (whether similar or dissimilar); various other things; et cetera, implying variety and miscellaneousness; 'that sort of thing,' as, 'some dead puppy, or log, or *what not*.' WHAT-NOT, n. a piece of furniture with shelves for receiving miscellaneous articles of use or ornament. WHAT IF, what will it matter if. WHAT THOUGH, what matters it though; even granting that; allowing that. WHATEV'ER, rel. -*ěv'ēr*, or WHAT'SOEV'ER, -*sō-ěv'ēr*, anything soever which; the whole that. WHAT DAY, on the day when. WHAT TIME, at the time when.

WHATCOM: town, cap. of Whatcom co., Wash.; on Bellingham Bay; 3 m. from Lake Whatcom, 125 m. from Seattle, 150 m. n. by e. of Olympia. The region is one of the richest in the entire northwest in timber, coal, and iron, and it is also one of the most prolific fruit and berry sections in the country. In 1890 it was the most northern settlement of importance in the Puget Sound country, and already had important railroad and steamboat connections, Pop. (1880) 13; (1890) 4,059; (1900) 6,834.

WHATELY, *hwāt'li*, RICHARD, Archbishop of Dublin 1787, Feb. 1—1863, Oct. 8; b. in Cavendish Square, London; fourth son of Joseph W., D.D., of Nonsuch Park, Surrey, prebendary of Bristol, vicar of Widford, and lecturer at Gresham College. He was sent in due time to a private school at Bristol, and 1805 passed to Oriel College, Oxford. He took his bachelor's degree 1808, taking a second class both in classics and in mathematics. He got the English-essay prize 1810. In 1811 he was elected a fellow of Oriel College, among whose fellows were Arnold, Keble, Pusey, and the elder Newman. About 1815 he wrote (originally for the *Encyclopædia Metropolitana*) what he afterward expanded into his popular treatises on Logic and Rhetoric. In 1821, the year of his marriage, he published two works—a volume of sermons on *The Christian's Duty with respect to the Established Government and the Laws*; and his celebrated and characteristic essay, *Historic Doubts relative to Napoleon Bonaparte*, whose object was to ridicule the criticism to which the Gospel narratives were subjected by skeptical writers, by applying the same kind of criticism to events within the memory of all the world, and starting doubts as to whether these events had occurred. This *jeu d'esprit* with a purpose created a great sensation, and has been translated into several foreign languages. In 1822 W. was presented to the living of Halesworth, in Suffolk. In the same year he delivered the Bampton lectures at Oxford, on *Use and Abuse of Party Feeling in Religion*. In 1825 he was appointed by Lord Grenville principal of St. Alban's Hall, which, under his energetic rule, quickly lost the bad character which it had long sustained in the university. In 1829 he was appointed prof. of political economy. In 1831, Lord Grey's govt., at the instance of Lord Brougham, appointed him abp. of Dublin and bp. of Glendallach: his episcopal charge was enlarged 1846 by the addition of the bishopric of Kildare.

During the ten years preceding his appointment to the archbishopric, W. had incessantly been writing and publishing, chiefly on theological and ecclesiastical subjects. He belonged to the liberal school in religion and in politics; he was opposed to high-church or 'Catholic' views in theology, and to toryism in politics. Though his Christianity was genuine, his keen and independent intellectual development of it caused the strictly evangelical party, equally with the high-church party, to distrust him: both noted that their party traditions were not accepted by him as authority. He had taken a keen interest in political questions, and had made himself conspicuous at Oxford by advocacy of Rom. Cath. emancipation, of which the party in the church which had most sympathy with the theology and ecclesiastical system of the Roman Church were the most determined opponents. When Sir R. Peel, after his change of views on the emancipation question, voluntarily submitted himself for re-election to the univ., W., though a liberal, came forward to support him. His *Essays on Some of the Peculiarities of the Christian Religion* appeared 1825; *Elements of Logic*, 1826; *Elements of Rhetoric*, 1828; *Essays*

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on *Some of the Difficulties in the Writings of St. Paul*, etc., 1828; *Thoughts on the Sabbath*, 1830; *Errors of Romanism traced to their Origin in Human Nature*, 1830. His *Introductory Lectures on Political Economy* were pub. 1831. By this time, his writings, and his immense industry and ability in his various public functions, had placed him among the foremost men of the univ., and had given him rank among the most remarkable thinkers and writers of his time. Though many distrusted him as a liberal, questioned the soundness of parts of his theology, or thought his manners too eccentric, and his habit of mind too peculiar, for one who was to rule over others, there could be no question that his abilities and reputation were equal to the high position to which he was called.

As abp. of Dublin, W. was very active in all matters of importance, social and ecclesiastical, and showed deep interest in every question affecting the welfare of Ireland. He was one of the original members of the board of national education, and continued a member till 1853, when he retired, in consequence of a departure, as he thought, having been made from the principles of unsectarian religious instruction for Rom. Catholics and Protestants alike, on which, till that time, the national education had been carried on. He was perhaps the most active member of the board, and the success of the national system was due largely to him. He and members of his family were always foremost in supporting well-devised charitable schemes. His beneficence was, in fact, unbounded; though an opposite impression prevailed among those who did not know him, because he wrote and spoke strongly against casual benevolence, and used to say he had never given a penny to a beggar. He gave great sums in charity, often without the knowledge of his nearest friends; and he and his family gave unwearièd labors to alleviate the miseries of the people in the terrible famine years. As archbishop, his rule was firm and judicious. A disregard of etiquette was about the worst thing ever alleged against him: he was not disposed to make much difference between a rector and his curate. His activity as an author was not stifled by his energetic discharge of his public duties; indeed, he seems to have been always either writing a book or affording literary help to others. Besides many charges, sermons, and a few pamphlets, his singularly vigorous and independent *Kingdom of Christ Delineated*, one of the most remarkable of his works; his *Introductory Lectures to the Study of St. Paul's Epistles*; his *English Synonyms*; and his annotated edition of Bacon's *Essays*—one of the best examples of good editing in the English language—belong to this period of his life. A work, published anonymously 1855, *Scripture Revelations respecting Good and Bad Angels*, has been generally ascribed to Whately.

The world's esteem and the regard of W.'s friends steadily increased in his later years. In early life there was much about him to shock the fastidious, and some things which might hurt the sensitive; but his peculiarities softened and

PLATE 2.

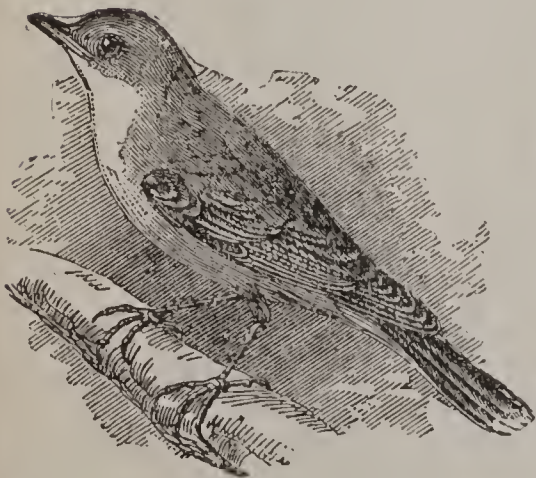
Whales' Food
Willow Moth.



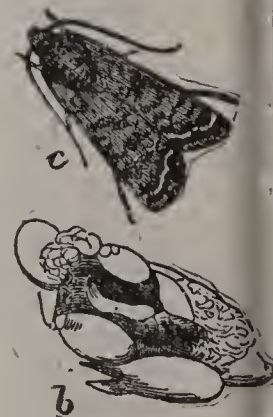
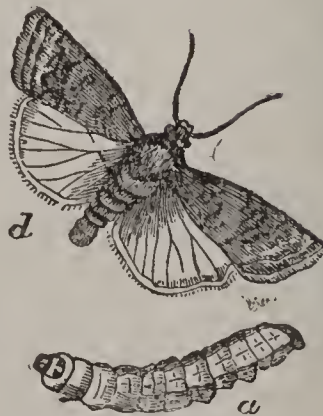
Whales' Food, consisting of minute Shrimps,
Sea-snails, Medusæ, etc.



Whale Louse.



Whitethroat
(*Curruca cinerea*).



Willow Moth (*Cardina cubicularis*).
a, caterpillar; b, pupa in its cocoon; c, willow
moth at rest; d, insect with wings expanded.

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wore off as he advanced in years. At Oxford he was noted for his unconventional, uncereimonious manners, for which (together with his white hat, rough whitish coat, and white dog) he was nicknamed the White Bear; and for the plain speaking and rough ridicule with which he would overwhelm an opponent in an argument. He was remarkable, too, for his fondness for athletic sports, which he indulged with indifference to the minor proprieties. He used to say that his abrupt and careless and seemingly unfeeling ways were a recoil from the painful shyness for which he had been remarkable in his youth. Those who knew him, however, made light of his peculiarities; and few things about him are more pleasing than his firm belief in the merits of his friends, and the number, the warmth, and the permanence of his friendships. He had great talents for conversation, and was famous for his bon-mots, happy repartees, and conversational pleasantries of every kind. His writings are remarkable not so much for subtlety of thought or novelty of view as for strong logic, acuteness, felicity of arrangement and exposition, and for the frequency and homely force of his illustrations. He had the happy power of building up materials which might be old into a new, commodious, and symmetrical structure. He did nothing for ornament's sake: though his imagination was abundantly fertile, it was used only to illuminate his argument; his images are seldom impressive for their beauty, though admirably fitted for didactic purposes. His theological works have been charged with a 'cold rationalistic' tendency, and with lack of reverence, and of due orthodoxy in doctrinal statements; but these criticisms may be charged probably to the critic's point of view. Besides his notable treatise on *Logic*, his *Historic Doubts*, the *Essays on the Peculiarities of the Christian Religion*, the *Errors of Romanism*, and the *Kingdom of Christ* are perhaps the most valuable and characteristic of his writings.—The *Life and Correspondence of R. Whately, D.D.*, etc., by his daughter (London 1866), is an interesting though in some respects partial and inadequate memorial of him: the letters, however, which form a great part of it, give an excellent impression of the qualities which distinguish his works.

WHAULE-EYE, n. *hwawol'i*: see WALL-EYE.

WHEAL, n. *hwēl* [Cornish *huel*, a mine]: in *Cornwall*, *England*, a mine.

WHEAL, n. *hwēl*, or WEAL, n. *wēl* [AS. *walu*, a weal (see also WALE 1)]: the raised streak left on the skin by a stripe, as with a cane; red and white marks on the skin, seen in cases of nettle-rash.

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WHEAT, n. *hwēt* [AS. *hwæte*; Goth. *hwaiteis*, wheat—from Goth. *hveits*, white (see also WHITE)]: a cereal grass of the genus *Triticum*, or the grain which it produces (see below). WHEATEN, a. *hwēt'n*, made of wheat. WHEATEEL, a disease in wheat; same as *Purples* (q.v.). WHEATMIDGE, n. same as WHEAT-FLY (q.v.). Note.—WHEAT-GRAINS, after being cleansed, are ground, the produce thus formed being termed *wheat meal*. 1. BRAN is the outer husks of the *wheat-grains*, and is first separated from the *wheat-meal* by sifting; 2. SHARPS, also called COMMON-THIRDS or POLLARDS, are sifted out of the bran by brushing or sieving, and are simply the finer portions of the *wheat-husks* or *bran*; 3. SECONDS, or MIDLINGS, are sifted from the *wheat-meal* after the bran; 4. COMMON FLOUR, or OVERHEADS, and PAIRING-MEAL, or FINE-THIRDS, are two qualities obtained by regrinding the *seconds*, and sifting; 5. FINE FLOUR is the produce obtained after such separations. BOLTING, the sifting processes through which wheat-meal is first made to pass—hence *wheat meal* is termed *unbolted flour*, and in the United States *chop*.

WHEAT: valuable cereal grass of the genus *Triticum*; distinguished by a spike with many-flowered spikelets, without stalks, seated one on each notch of the rachis, their sides directed to the rachis, which is zigzag; and two glumes, of which the lower is either awned or awnless; the outer palea of each floret having at the top a notch, in the centre of which is the terminal point, sometimes prolonged into an awn, or, in some species, with many florets tapering into an awn without a notch. A number of varieties are found in Britain, of which *T. repens*, well known as Couch Grass (q.v.), is the most common; but the seeds of none of them are of any value. The native country of the cultivated W. is uncertain, but has generally been supposed to be the central part of Asia.

Botanists differ greatly in regard to the origin of W., some holding that it has undergone comparatively little change, while others believe that it has been developed from the *Aegilops ovata*, a grass somewhat resembling W., found near the Mediterranean Sea. They differ also regarding the number of species, some naming over 30, while others refer the hundreds of varieties and sub-varieties to a single species.

W. has been cultivated from the earliest ages, and was a chief crop in ancient Egypt and Palestine, as it still is in all temperate parts of Europe, Asia, and Africa. It is very largely grown in and exported from India. Vast areas in central Canada and the n. part of the United States are admirably adapted to its cultivation, as are also considerable portions of S. America and Australia. In the torrid zone W. does not thrive, except in elevated situations; but it yields well in subtropical regions, though it is a hardy plant, and when covered by snow endures even very severe winters. For its successful cultivation, however, it requires a mean temperature of at least 55° F. for three or four months of the year. Consequently it cannot be grown as far n. as barley, oats, or rye. It was

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brought to America by the Spaniards about 1530, when they began raising it in Mexico. In 1602 Gosnold sowed W. on one of the Elizabeth Islands, in Buzzard's Bay, and 9 years later it was introduced into Va. For a long time the centre of production for the United States was in Penn.; but since 1855 it has been rapidly moving west.

COMMON W. (*T. vulgare*, *æstivum*, or *sativum*) grows to a height generally of 3 or 4 ft., and has ears or spikes generally 3 or 4 inches long, the spike 4-cornered, the spikelets about 4-flowered; the paleæ ventricose, ovate, truncate, mucronate, or awned, compressed under the point, rounded at the back, the grain free. In consequence of long cultivation, in a great variety of climates, the cultivated varieties of W. are very numerous. New varieties are continually coming into notice, many of which are popular in the regions of their origin, though little known beyond them. Some botanists have attempted to distinguish species among them, appropriating the name *T. æstivum* to the awnless kinds, and *T. hybernum* to the awned; but intermediate forms are very numerous, and the length or shortness of the awn seems to depend on accident. Besides being classified as bearded and smooth, the varieties in cultivation are distinguished also by the color, as *white* and *red*; and as soft or hard wheats, according to the texture of the grain.

Although W. succeeds in a great variety of soils, it thrives better in either clay or loam than in sand, as the former are more compact than the latter and contain a larger proportion of the mineral elements which the plant requires. Wet lands need to be thoroughly underdrained to fit them for this crop. W. will follow corn well if the land was liberally manured and kept free from weeds; but many farmers prefer to sow it on an inverted clover sod. A system of rotation (see ROTATION OF CROPS) will give larger yield, tend to prevent the excessive multiplication of insect enemies, and in other ways is much better than raising W. many years in succession on the same land. It is well to do the plowing some weeks before the time for putting in the seed, as this will allow the ground to settle, and thus get into better mechanical condition than would otherwise be possible. But just before sowing, the surface soil must be made very fine and mellow. Though in many respects a hardy plant, W. is a rather delicate feeder, and does not have the power of so completely abstracting from the soil the elements which it requires and which the land contains as some other plants do. This makes it necessary that an abundance of plant food be supplied, and in a condition to be readily assimilated. Thoroughly decomposed barnyard manure is excellent; but fresh manure has a tendency to promote large growth of straw with but little grain, and is also liable to introduce the seeds of foul plants. Commercial fertilizers (see FERTILIZERS) often give excellent results: this is true particularly of those prepared with special reference to the requirements of this crop. On many soils lime is highly beneficial in giving strength to the straw and increasing the quantity of the

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grain: to some extent it serves directly as food for the plants, but more largely in preparing for their use the organic matters and the silicate of lime which the soil contains.

The variety of W. to be grown should be selected with reference to the climate; to the character, condition, and adaptation of the soil; to the wants of the grower, and the demands of the market. In some regions spring W. thrives much better than winter, and about $\frac{1}{3}$ of all the W. grown in the United States is of spring varieties. The average yield per acre of spring W. is a little higher than that of the winter kinds. When grown under equally favorable conditions there appears to be very little difference in vigor and productiveness between the white and the red or the bearded and the smooth kinds; but some growers claim that the red varieties are less liable to injury from bad weather after harvesting than the white kinds. There is little difficulty in finding a variety adapted to the prevailing conditions in any part of the country, and the plant is so susceptible to modifications that by a careful selection of the finest grains and growing on good soil a marked improvement in yield and quality can be secured in a few years. Some excellent varieties have been obtained also by hybridization (see HYBRID). The best grain should be selected for sowing, and be very carefully cleaned to free it from the seeds of weeds and other plants. Measures should be taken to destroy any spores of smut (see SMUT) which may adhere to the grain. Seed not more than one year old is best for sowing. The quantity of seed required per acre varies somewhat with the variety and the condition of the soil. A fair average may be stated as $1\frac{1}{2}$ bushels if sown broadcast, and 1 bushel if drilled. The latter method is greatly to be preferred (see SOWING OF SEED). At the north, winter W. should be sown in Sep., and at the south in Oct. or Nov. Spring W. is to be sown as soon as the ground is dry and warm and can be got into proper condition to receive the seed. Many carefully conducted experiments indicate that rather shallow covering ($1\frac{1}{2}$ to 2 in.) is better than deeper planting. In some countries the growing W. receives considerable cultivation, but in the United States this is seldom attempted, though various tests have shown that where drill-sowing is practiced it might be made profitable. The winter varieties of W. at the n. are ready to harvest in July, and the spring sorts in Aug. Where only small quantities are grown, the cutting is sometimes done with a sickle, but usually with a cradle, which has almost entirely superseded the former instrument; but where W. is grown to a large extent, it is cut by machines (see REAPING). Rather early cutting is desirable, as it prevents much waste of grain by shelling in the field, and gives a whiter flour and a better quality of straw. When sufficiently cured, the W. is stacked, or else drawn to the barn. Where only a few acres of W. are grown on any one farm, threshing is done with a flail or a small horse-power machine: one of the latter often supplies the needs of all the growers in the

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neighborhood. In regions in which large quantities of W. are produced, large machines, driven by horse or steam power, are employed (see THRESHING). Considerable quantities of W. are converted into starch and glucose, a little is used for manufacture of alcoholic liquors, but most of it is made into flour (see FLOUR). The Bran (q.v.) is a valuable food for cows giving milk, and is profitably fed to some other classes of live-stock. The straw is sometimes used for feeding: for this purpose it should be carefully cured and should be used in connection with oil meal, Indian meal, or bran. It is largely used also for manure, and for manufacturing purposes: see STRAW: STRAW-MANUFACTURES.

W. is subject to several parasitic diseases, of which the principal ones are rust and smut, and which often prove very destructive. The *rust* is a microscopic fungus which spreads and multiplies with extreme rapidity by means of spores blown about by the wind (see RUST—disease). This disease is much more destructive in damp than in dry weather, affects some varieties far more than others, and, like all other diseases of this class, is much more likely to attack weak plants than those which are strong. Many careful observers believe that rust is sometimes generated on and disseminated from barberry bushes (see BARBERRY). It may also be spread by the use of undecomposed straw from affected fields. *Smut* also is propagated by spores. Preventive measures, for both rust and smut, consist in thorough drainage, not only of the surface ground but also of the subsoil; supplying liberal quantities of the mineral elements required for perfect development of the grain and straw, together with a sufficient but not excessive quantity of nitrogen; selecting a good quality of seed of hardy varieties; washing the seed in a solution of blue vitriol or in hot water (see SMUT); and sowing lime over the plants, in the early spring, when they are wet with dew (see BUNT: MILDEW). W. is exposed to the attacks of several insect enemies. Among these are the Chinch-bug (q.v.), which in some seasons, particularly those which are dry, causes immense losses to grain-growers. The artificial spreading among these insects of a very contagious and fatal disease is a recently discovered method of defense against their ravages, and promises to be highly successful. The Wheat-fly (q.v.) is sometimes very destructive, as is also the Hessian fly (see HESSIAN FLY: also CORN MOTH: WIRE-WORM: EAR-COCKLES). Thorough preparation of the land, use of suitable fertilizers and of whatever tends to promote vigorous growth and full development of the plant, will lessen the degree of injury which W. will suffer from insects.

The composition of W. varies considerably with the climate, soil, and variety. Gluten, its most valuable food constituent, is found in larger proportions in American than in English W.; and in W. grown in the southern there is more than in that grown in the northern United States. Among leading varieties of W. grown in this country are: the Fultz, a red winter sort from Penn., which

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was distributed by the U. S. dept. of agriculture 1871, and is now (1892) much more extensively grown than any other kind; the Red Mediterranean, also a winter sort, imported from France about 1875; the Clawson, a hardy winter kind with red chaff and white kernel; and the Fife, a spring variety very largely grown in the n.w. Nearly half of the W. grown in this country is represented by these 4 kinds. Other sorts are the Diehl, Garfield, Surprise, Canadian Velvet Chaff, and Bonnell—all white winter kinds. The Black Sea, White Russian, Defiance, and Champlain (the latter two hybrid sorts) are popular spring varieties. Soft varieties are preferred for manufacture of starch, but the hard sorts, containing larger proportion of gluten, are better for flour: see FLOUR.

SPELT (*Triticum spelta*) is regarded as a distinct species from Common W., and is supposed to be a cultivated form of *Egilops caudata*, native of the countries near the Mediterranean. The spikelets are smaller than in Common W., and each spikelet has two or three, rarely four, perfect florets, besides a barren terminal one; the outer glumes and the paleæ are very broadly truncate at the top, and notched; the awns very slender; the ripened grain adheres closely to the paleæ or chaff. Spelt is supposed to be the grain called *Zea* by the Greeks and *Far* by the Romans. It is of little value in comparison with W.; but can be grown on inferior soils, and is cultivated in Switzerland at an elevation where W. would not thrive. The bread made of it is coarse, and is used chiefly by the poorer classes.—Another species, sometimes called LESSER SPELT, or ONE-GRAINED W. (*Triticum monococcum*), is occasionally cultivated on poor soils and in elevated situations in central and s. Europe: it is sometimes called St. Peter's Corn. The ear is small and compressed; the spikelets contain only one perfect floret and a rudimentary one; the awns are long; the grain is small, and adheres closely to the chaff.—*Triticum Bengalense* is regarded as a kind of spelt. It has remote spikelets, long awns, and long, irregularly triangular grains.

The quantity of W. produced in the United States 1890 was 399,362,000 bushels, grown on 36,087,154 acres of land, and valued at \$334,773,678; average yield per acre 11.1 bushels; average value 83.8 cts. per bushel, and \$9.28 per acre. The production, area, and yield were below the average of the ten preceding years—production being 449,695,359 bushels, area 37,279,162 acres, and yield per acre 12.1 bushels. The greatest quantity produced in one year during this period was 512,765,000 bushels (1884); greatest average yield 13.6 bushels per acre (1882); highest average value per acre \$12.48 (1880). The states ranking lowest in production 1890 were Conn., 30,000 bushels, and N. H., 140,000 bushels. The state ranking highest in this respect (aside from the Dakotas, which were reported together in the govt. estimates and which produced 40,411,000 bushels) was Minn., 38,356,000 bushels. The other states yielding more than 20,000,000 bushels each were: O. 29,984,000; Cal. 29,121,000; Kan. 28,195,000; Ind. 27,928,000; Mich. 20,271,000. During a period of 10 years

WHEAT.

(1880-89) the states having the lowest average yields of W. per acre were S. C. and Miss., each with 5·7 bushels; and N. C., Ga., and Ala., each with a yield of 6 bushels. The highest yield in any state was in Colo., 19·5 bushels. The other states and territories with a yield exceeding 16 bushels per acre were: Mass. and Or. 16·3 each; Conn., 16·6, Vt. 16·9; Wash. 17; Ida. 17·1; Ut. 17·2; Mont. and Nev. 17·6 each; and Wyo. 18. During 1858-91 the price of W. in the Chicago market reached its lowest point, 50 cents per bushel, 1859, July and Aug. and its highest, \$2.85 per bushel, 1867, May. During the 10 years 1882-91 inclusive the only times when it has in this market exceeded \$1.13½ (which it reached 1883, June) were 1882, Apr. and May, \$1.40; 1888, Sep., when the 'Hutchinson corner' carried it to \$2.00; and 1891, Apr., \$1.16. W. is exported from the United States to various European countries, Central and S. America, and in small quantities to Asia, Africa, and to numerous islands. For the year ending 1891, June 30, the exports of W. amounted to 55,131,948 bushels, and of W. flour to 11,344,304 barrels; the former valued at \$51,420,272, and the latter at \$54,705,616. The total W. crop of the world 1890 was estimated at 2,059,000,000 bushels.

In the United States the season of 1891 was highly favorable for production of this crop. A large area was sown, and a very heavy yield was secured. The reports of the dept. of agriculture indicate that the area in W. for this year was 39,985,620 acres; average yield per acre 15·3 bushels; total crop of the country 611,780,000 bushels. The states ranking lowest in quantity produced were: Conn. 31,000; Wyo. 110,000; and N. H. 148,000 bushels. The states producing the largest quantities were: Minn. 55,333,000; Kan. 54,866,000; Ind. 52,807,000; N. D. 52,105,000 bushels. The other states producing more than 30,000,000 bushels each were: O. 45,531,000; Cal. 36,595,000; Ill. 35,025,000; Mich. 30,205,000.

According to official statistics the W. crop of the world 1891 was 2,424,102,000 bush.; (1895) 2,566,164,000 bush. The acreage of farm lands under W. in the U. S. (1894) was 34,882,436 acres; yield 460,267,416 bush.; average yield per acre 13·2 bush. The chief wheat-producing states 1894 were: Ohio 48,444,471 bush.; Ind. 43,644,064 bush.; Minn. 37,752,453 bush.; Kan. 35,315,259 bush.; N. Dak. 33,635,000 bush.; Ill. 33,312,370 bush.; Cal. 30,376,705 bush. In 1900, of the 5,739,657 farms in the U. S., 2,053,912, or 35.8 per cent., produced wheat. In 1902 there were in the U. S. 46,202,424 acres, under wheat, which produced 670,063,008 bush., valued at \$422,224,117. The wheat crop of the world aggregated 2,820,333,614 bush. The exports of W. from all parts of the U. S. were (1895) 66,371,200 bush.; (1896) 82,748,191 bush., of which 20,210,723 were shipped from San Francisco, Cal., and 18,476,263 from N. Y.; (1901-2) 154,856,102 bush., value \$112,875,222. Average price per bush. for exported wheat, 63.8 cents. In 1897, Aug. 24, price of wheat rose to \$1.13½ per bush., and two days later dropped to \$1.02½.

WHEATEAR.

WHEATEAR, *hwēt'ēr*, or FAL'LOW-CHAT: a bird of the genus *Saxicola* (*Saxicola œnanthe*), of the family *Sylviadæ*, a common summer visitant of Great Britain, abounding on downs and fallow fields. Its winter retreat is in the countries near the Mediterranean, chiefly in Africa; its summer migrations extend to n. Europe and to Iceland and Greenland. A few spend the winter on the s. coasts of England. The length of the W. is about 6½ in.; the tail is almost square; the wings are long and pointed; and the legs are long, enabling the bird to hop about actively in quest of food. The male is of ash-brown color on upper parts; forehead, a band above the eyes, and throat, white; a black mark from the base of the bill to each eye, and expanding behind it; wings, black; two-thirds of the tail, except the two middle feathers, white; tip of the tail,

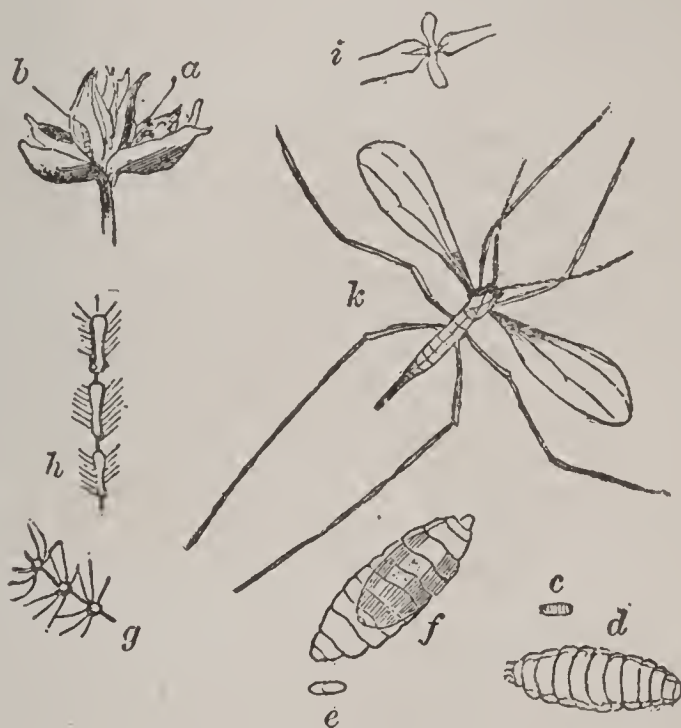


Wheatear (*Saxicola œnanthe*).

black; breast, buff-color. The female is less gayly colored, brown and gray prevailing. The W. makes its nest in an old wall, or in a crevice of a quarry or gravel-pit, often in a deserted rabbit-burrow. The male has a pleasant but not loud song, and sings well as a cage-bird in winter as well as in summer. The W. is much esteemed for the table. The shepherds catch them in nooses placed in little excavations made in the ground, advantage being thus taken of the habits of the bird, which upon the least alarm runs to hide itself in any little hollow that may be near. The usual practice of the shepherds is to cut out an oblong piece of turf, about 11 in. by 8, and 6 in. thick, which they lay across the hole that is made, making sloping entrances at the ends of the hole, and setting nooses under the turf in the centre: as many as 84 dozen wheatears have been thus caught by a single shepherd in a day. It is not unusual for a shepherd and his lad to look after 500 to 700 of these traps.—The Yellow-breasted Chat of the United States (*Icteria virens*), olive green, the throat and breast bright yellow, measures more than 7 in., and it has a loud song; it is now included, with other new-world warblers, in the family *Mniotiltidæ*.

WHEAT-FLY.

WHEAT-FLY: popular name of certain dipterous insects, often very injurious to wheat-crops. One of them, *Cecidomyia tritici* of Kirby (see CECIDOMYIA), *Triticum vulgare* of Fitch's N. Y. Reports, sometimes called the WHEAT MIDGE, causes great damage. It is the fly which appeared in Vermont 1820, probably imported from the old world into Canada. It destroyed a tenth part of the wheat-crop for several years, disappearing only on being starved out in that region by a change of crop, or by late spring sowing of wheat. It spread in a few years e., s., and w. In N. Y. 1854 the damage was estimated at \$15,000,000, and the value of wheat lands soon fell from \$70 to \$40 per acre in w. N. Y. The first public notice of it in England was in 1740; and, very curiously, its first con-



Wheat-fly (*Cecidomyia tritici*).

(From Morton's *Cyclopædia of Agriculture*.)

a, larva in spikelet of wheat; *b*, pupa in the same; *c*, larva, natural size; *d*, the same, magnified; *e*, pupa, natural size; *f*, the same, magnified; *g*, a few joints of one of the antennæ of a male wheat-fly; *h*, the same of female; *i*, female wheat-fly, natural size; *k*, the same, magnified.

siderable ravages were simultaneous with its destructiveness in America. First noticed in France 1842, it became very injurious about the same time (1854-5) that it laid waste the crops of w. N. Y.—The eggs are deposited in the wheat when it is coming into flower, and the larvæ, abstracting the juices, cause the grain to shrivel. The perfect insect appears in June, when great numbers may sometimes be seen on wing in the evening, their chief time of activity. It is about one-tenth of an inch in length, pale ochreous or orange, downy, with large black eyes and long slender legs; the male with very long antennæ. The male, however, is so very minute that in 1859 it had been recognized only by Dr. Asa Fitch and by

WHEATLEY—WHEATON.

a German entomologist. The antennæ of the male differ much in structure from those of the female, as will be seen by the annexed figure (*g, h*), and are of 25 joints, while those of the female have only 12. The size and coloring are variable, but Dr. Fitch describes the constant characters of the female thus: body bright orange or lemon yellow, tarnished with smoky on the back forward of the wings, which are clear and glassy, with a small cross-vein near their base; the antennæ, about as long as the body, are composed of 12 oblong joints, narrower in their middles and separated by short pedicels. The remedies that he favors are burning the thresher screenings, and deep plowing to kill the larvæ left in the ground. The larvæ are small, and orange or lemon-colored. For full account and engravings, see Dr. Fitch's Sixth N. Y. State Report, 1861. A little black ichneumon lays its eggs in the larvæ of the W., and is thus useful to the farmer by destroying it.—The name W. is given also to species of the genus *Chlorops* (see CORN FLY) destructive to wheat.

WHEATLEY, *hwē'tlē*, PHILLIS: negro poetess: about 1753–1784, Dec. 5; b. Africa. She was brought to this country as a slave 1761, was bought by John Wheatley, of Boston, taken into his family, and educated by his daughters. She developed remarkable brightness in acquiring an education, and at 14 years of age began to write poetry. In 1773 a volume of her poems, with a portrait, was published in London. She went to England the following year, where she was kindly received by the Countess of Huntingdon and others. In 1775 the family of her benefactors, the Wheatleys, being broken up by death, she attempted to support herself, but failing, her last days were spent in poverty. She died in Boston.

WHEATON, *hwē'ton*, FRANK: soldier: b. Providence, R. I., 1833, May 8. He was educated at the public schools, and studied civil engineering at Brown Univ.; 1850–55 was engaged in the U. S. boundary surveys; 1855, Mar. 3, commissioned 1st lieut. in the 1st U. S. cav.; served till 1860, June, on frontier duty; 1861, Mar., promoted capt.; 1861, July 16, appointed lieut.col. of the 2d R. I. vols., and col. after the first battle of Bull Run; 1869, Nov., appointed brig.gen. of vols.; commanded a brigade in the 6th corps and a division at Gettysburg. For gallant services on the field he was brevetted brig.gen. of vols., and subsequently brevetted maj.gen. of vols.; 1866, July 28, appointed lieut.col. of 39th U. S. infantry, and 1874, Dec. 15, col. of the 2d infantry. In 1893, April, he was promoted brigadier-general, U. S. A.; 1897, April, major-general, and was retired May 8. following. After the war he held commands in the west.

WHEATON—WHEATSTONE.

WHEATON, HENRY: jurist and diplomatist: 1785, Nov. 27—1848, Mar. 11; b. Providence, R. I. He was educated at Brown Univ.; admitted to the bar 1802; after which he spent several years in France, and 6 months in London, in legal and literary studies. - On his return he resided in New York, where he contributed papers on international law to the *National Advocate*, a daily newspaper, and was appointed a justice of the marine court. In 1815 he published *Digest of the Law of Maritime Captures or Prizes*, one of the standard works on the subject. About the same time he published *Essay on the Means of Maintaining the Commercial and Naval Interests of the United States*. He was reporter of the proceedings of the U. S. supreme court 1816-27. His Reports (12 vols.) a distinguished German has called 'the Golden Book of American Law;' and with the legal profession it ranks as a work of extraordinary ability and value. He made frequent contributions to the *North American* and *American Quarterly Reviews*, and delivered addresses before literary societies. In 1825 he was engaged in revising the statute laws of New York; 1826 he wrote his *Life of William Pinckney*, of which he furnished an abridgment for Sparks's *American Biographies*. In 1827 he was appointed U. S. *chargé d'affaires* to Denmark, and resided at Copenhagen till 1835, when he was appointed resident minister at Berlin, and 1837-46 was minister plenipotentiary: the latter place he resigned on the demand (widely censured) of Pres. Polk, who saw need of the place for another appointment. His *History of the Northmen* appeared at Philadelphia, London, and Paris, 1831; *Elements of International Law*, 1836; his essay, for which he received the prize of the French Institute, entitled *L'Histoire du Droit des Gens en Europe, depuis la Paix de Westphalie jusqu'au Congrès de Vienne*, 1841—pub. 1846, greatly enlarged, in Leipzig and Paris, and English transl. in New York, by William B. Lawrence. This work is a standard authority, and its author received the highest honors from the learned societies of Europe and his own countrymen. He died at his residence at Dorchester, Mass.

WHEATSTONE, *hwēt'ston*, Sir CHARLES, LL.D.: English physicist, practically the founder of modern telegraphy: 1802, Feb.—1875, Oct. 19; b. Gloucester. From school he went to the making of musical instruments, and afterward entered into business on his own account in London, whither the family had removed 1806. But he was no ordinary manufacturer: the scientific principles of his instruments occupied his thought; he made many improvements, and 1823 published a paper entitled *New Experiments on Sound*. His remarkable ingenuity produced numerous models and apparatus to illustrate the phenomena of acoustics and of light, his attention having been drawn to the latter by the analogies between the two subjects. Few men have done so much toward enabling the student to apprehend the principles on which scientific theories are based, particularly those of the undulatory theory of light.

WHEATSTONE.

In 1833 W. communicated his first paper, *On Acoustic Figures*, to the Royal Soc.; followed, 1834, by *Experiments to Measure the Velocity of Electricity*, in which, with a mirror revolving 800 times in a second, he demonstrated the velocity at 288,000 m. in a second—greater than that of light. In the same year he was appointed prof. of nat. philos. in King's College, London. In 1836 he was elected a fellow of the Royal Soc.; and in a course of lectures at the college on the velocity above referred to, he anticipated the electric telegraph by experimenting through four miles of copper wire. His natural shyness interfered with his success as lecturer; hence Faraday gave the first public description of many of his investigations. In 1837, May, a patent was taken out in the joint names of Cooke and W., 'for improvements in giving signals and sounding alarms in distant places by means of electric currents transmitted through metallic circuits.' From this instrument, which had five needles, has grown the vast system of electric telegraphs in the United Kingdom. His first working-telegraph—insulated copper wires inclosed in an iron tube—was constructed on the Black-wall railway 1838.

To enumerate the titles only of W.'s papers on scientific subjects, and describe his various inventions, would fill many pages: a few only can be indicated here. In a paper on binocular vision, before the Royal Soc. 1838, he explained the principle of the stereoscope, an instrument of his invention; 1840 he showed that, by means of electro-magnetism, a number of clocks far apart might be kept going with absolute exactitude from one central clock; 1843 he brought out his new instruments and processes for determining the constants of a voltaic series. In 1840, and again 1843, the Royal Soc. awarded him their royal medal. For a long time after that date, scarcely a year passed without a paper on some recondite scientific subject, or some new invention, or improvement on former inventions, from his hand. Among his inventions are his cryptograph; his automatic telegraph in two forms; his telegraph thermometer and barometer, by which an observer at the foot of a mountain could read the indications as shown by the instruments on the summit; a machine for conversion of dynamical into electrical force without use of permanent magnets, by which large quantities of electricity can be produced at a cheap rate; and an apparatus for conveying instructions to engineers and steersmen on large steam-vessels.

Prof. W. sat many times on the council, and was a vice-president of the Royal Soc. He was also a corresponding member of the leading foreign scientific academies, and 1873 he was elected foreign associate of the science dept. of the Institute of France. In 1868 he received knighthood, and the Royal Soc. bestowed on him its Copley medal.

WHEDON—WHEEL.

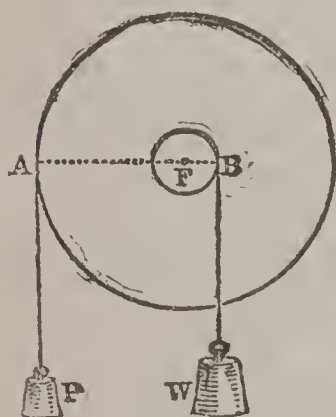
WHEDON, *hwē'don*, DANIEL DENISON, D.D., LL.D.: Methodist Episc. minister, and author: 1808, March 20—1885, June 8; b. Onondaga, N. Y. He graduated at Hamilton Coll. 1828; studied law; was teacher in Cazenovia Seminary 1830-1; tutor at Hamilton 1831-2; and prof. of ancient languages and literature in Wesleyan Univ., Conn. 1833-43. After ordination in the Meth. Episc. Church, he was stationed at Pittsfield, Mass., 1843-45, and Jamaica, L. I. For 7 years from 1845 he was prof. of logic, rhet., and hist. in Mich. Univ., and for 28 years from 1856 editor of the *Meth. Quarterly Review* and of the publications of the Meth. Book Concern. Besides numerous review articles, he published *Public Addresses* (1856); *Commentary on Matthew and Mark* (1860); the *Freedom of the Will*, reviewing Jonathan Edwards and others (1864); *Commentary on the N. Test.*, 5 vols. (1860-75); *Commentary on the O. Test.*, 7 vols. A posthumous volume was published, *Essays, Reviews, and Discourses* (1887). He died at Atlantic Highlands, N. J.

WHEEDLE, v. *hwē'dl* [Ger. *wedeln*, to wag the tail to fan—from *wedel*, a fan, brush: the transition from *fanning* to *flattering* would not be difficult]: to persuade by coaxing or flattery; to flatter in order to gain a private end; to entice by soft words; cajole: N. cajoling with soft words. **WHEE'DLING**, imp. *-dling*: ADJ. enticing, as by soft and flattering words: N. the act of flattering or enticing by soft words. **WHEE'DLED**, pp. *hwē'dld*. **WHEE'DLER**, n. *-dler*, one who wheedles.

WHEEL, n. *hwēl* [AS. *hweol*; Dan. *hiul*; Icel. *hrcl*, anything circular, a wheel: Dut. *wiel*, a wheel: W. *cheryl*, a turn, a course: comp. Gael. *cuidhill*, to wheel, to roll]: a circular frame of wood or metal arranged to turn on an axis; an apparatus or machine consisting essentially of a wheel, or of which a wheel is the principal part, used for some special purpose, as a spinning-wheel, a potter's-wheel, a mill-wheel, a steering-wheel (the circular frame with short projecting handles on its outer edge by which the steering-gear of a ship is controlled and the ship steered), a bicycle, etc.; an instrument of torture on which persons were formerly tortured and put to death in some countries (see **WHEEL, BREAKING ON THE**); a turning about, as on a pivot, as a body of soldiers; rotation; revolution; a compass about: V. to move on wheels; to convey on wheels; to turn on an axis; to have a rotatory motion; to whirl; to move round; to cause to turn round; to take a circuit round; to make a whirl round; to provide with wheels. **WHEEL'ING**, imp.: ADJ. conveying on wheels; turning: N. the act of conveying materials, as on a wheelbarrow; a turning or circular movement of a body of troops. **WHEELED**, pp. *hwēld*: ADJ. provided with wheels. **WHEEL'ER**, n. *-ēr*, one who wheels; the horse next the wheel; a shaft-horse as distinguished from a leader, in driving tandem; a wheelwright. **WHEELBARROW**, a barrow with one or more wheels: the most common form has a wheel at one end and two shafts at the other, by which it is held up with the hands, and so driven forward or pulled. **WHEEL-PLOW**, or **WHEEL-**

WHEEL.

PLOUGH, a plow having one or two wheels attached, for rendering the instr. more steady to hold, and for regulating the depth of the furrow. **WHEELSWARE**, *-swārf* [prov. Eng. *swarf*, the dust and grit from grindstones used in grinding cutlery]: a clayey cement made in Sheffield from the dust resulting from the wearing of grindstones, used in the steel-converting furnaces for covering the layers of iron and charcoal. **WHEEL-WINDOW**, a circular window with radiating mullions resembling the spokes of a wheel. **WHEELWRIGHT**, one whose trade is to construct wheels and wheel-carriages, as carts. **WHEEL AND AXLE**, the second of the Mechanical Powers (q.v.), a modification of the Lever (q.v.), consisting in its most primitive form of a cylindrical axle, on which a wheel, concentric with the axle, is firmly fastened. When employed for raising heavy weights, the weight is attached to a rope wound round the axle, and the power is applied either to a rope wound round the grooved



rim of the wheel, or to a handle fixed at right angles to the wheel's rim (in the latter case the wheel may be dispensed with, unless it is useful as a conservator of momentum [see **FLY-WHEEL**], and an ordinary winch substituted). The figure exhibits a transverse section of the common form of the wheel and axle, and shows that it is neither more nor less than a lever, whose extremities are not points as in the normal form, but the circumferences of the

circles, whose radii are FA and FB . Accordingly, the power and weight are attached not to particular points in these circumferences, but to cords wound round them; thus the imaginary simple lever, AB (formed by joining the points where the cords become tangents to the circles), is preserved unaltered in position and magnitude. The conditions of equilibrium are, that $P \times AF = W \times FB$, or, since the circumferences of circles are proportional to their radii, that $P : W :: \text{circumference of axle} : \text{circumference of wheel}$. When there is no wheel, but only a winch, the circumference described by the power in one revolution is substituted for the circumference of the wheel. The *capstan* and *windlass* are simple and common examples of this mechanical power; and combinations of toothed wheels, or of wheels from one to another of which motion is communicated by an endless band, are compound illustrations of the same. See **WINDLASS**.

WHEEL, BREAKING ON THE: barbarous mode of inflicting the punishment of death, formerly in use in France and Germany, where the criminal was placed on a carriage-wheel, with his arms and legs extended along the spokes, and, the wheel being turned round, the executioner fractured his limbs by successive blows with an iron bar, which were repeated till death ensued. There was considerable variety in the mode in which this punishment was inflicted, at different times and in different places,

WHEEL-ANIMALCULE—WHEELER.

By way of terminating sooner the sufferings of the victim, the executioner was sometimes permitted to deal two or three severe blows on the chest or stomach, known as *coups de grace*; and occasionally, in France at least, the sentence contained a provision that the criminal was to be strangled after the first or second blow. Mercy of this kind was, however, not always allowed to the victims of the wheel: when Patkul, envoy of Peter the Great, was put to death on the wheel by order of Charles XII. of Sweden, it is said that the officer in command of the guard was cashiered by the Swedish king for having allowed the head to be struck off before life was extinct in the mangled limbs. The punishment of the wheel was abolished in France at the Revolution; in Germany it has been occasionally inflicted during the 19th c., for treason and parrieide.

WHEEL'-ANIMALCULE: see ROTATORIA.

WHEEL'ER, JOSEPH: soldier: b. Augusta, Ga., 1836, Sep. 10. He graduated at West Point 1859; 1860 was commissioned 2d lieut. of dragoons; 1861, Apr. 22, resigned and entered the Confederate army; 1861, Sep. 4, made col. of the 19th Ala. infantry; commanded an infantry brigade at Shiloh; subsequently appointed to a cavalry command; 1862, Oct. 30, promoted brig. gen.; 1863, Jan. 19, commissioned maj. gen.; 1865, Feb. 28, received promotion to the rank of lieut. gen. On the death of Gen. James E. B. Stuart, 1864, May 11, he became the senior cavalry gen. of the Confederate forces, and remained in command until the surrender at Appomattox. After the war he studied law, which he has since practiced; and he is also a cotton-planter. In 1880 he was declared elected to congress from Ala. as a democrat; but his election was contested and he lost his seat. He was elected and represented his district in congress (1892). When hostilities between Spain and the United States began W. was appointed major-general to command the cavalry division and, although 61 years old at the time (1898), took part in the capitulation of Santiago de Cuba. Receiving his commission May 4, he arrived at Daiquiri, Cuba, with his command June 20-21 and participated in the fighting at Las Guasimas, El Caney, and San Juan Hill. On July 14 he was appointed commissioner to make arrangements for the surrender of the Spanish army; served in the Philippines from 1899, Aug., till 1900, Jan.; was appointed a brigadier-general, U. S. A., 1900, June 16, and was retired Sept. 10 following.

WHEEL'ER, NATHANIEL: inventor: b. Watertown, Conn., 1820, Sep. 7. He was educated in the public schools, and became a carriage manufacturer. In 1850 Allen B. Wilson, who needed assistance in securing patents on a sewing-machine which he had invented, applied to W. to assist him; and 1853 the machine was patented as the Wheeler and Wilson; and the Wheeler and Wilson Manufacturing Co. was formed 1853. W. served in the Conn. legislature a number of terms as senator and member of the house. He received patents for various other inventions. He died 1893, Dec. 31.

WHEELER—WHEELING.

WHEEL'ER, WILLIAM ALMON: statesman, vice-pres. of the United States: 1819, June 30—1887, June 4; b. Malone, Franklin co., N. Y. After two years' study in Vermont Univ., he was obliged by the death of his father to relinquish his collegiate course. He began the practice of law 1845 at Malone; was for some years dist. atty. of the county, and a member of the legislature 1849. On the formation of the free-soil party, he became an adherent, and continued with the party under its name republican. He gave up his law practice on account of a throat ailment, and was pres. of the railway from Ogdensburg to Rouse's Point. In 1858-9 he was in the N. Y. state senate, presiding there and in the constitutional convention of 1867. In 1860 he was elected to the U. S. senate, and again in 1869, serving 8 years; and was chairman of the Pacific railway committee, and a member of other important committees—e.g., that on southern affairs, in connection with which he originated the Louisiana compromise of 1873, when two rival governors were in military conflict. In 1876, on the republican ticket with Pres. Hayes, he was elected vice-pres., and after the term of office retired to Malone, where he died. He was known as a man of sterling intellectual and moral qualities.

WHEELERA, *hwēl-ē'ra*: genus of trees of nat. order *Leguminosæ*, sub-order *Papilionaceæ*. The wood of *W. ebenus*, native of the W. Indies and of tropical America, is exported under the name *American Ebony*. It is very hard, of brownish-green color, takes fine polish, and is used by cabinet-makers and musical-instrument makers.

WHEELING, *hwēl'ing*: city, port of entry, and cap. of Ohio co., W. Va.; on the Ohio river and Wheeling creek, and on the Baltimore and Ohio, the Cleveland and Pittsburgh, the Ohio river, the Pittsburgh Cincinnati Chicago and St. Louis, the Wheeling and Elm Grove, and the Wheeling Bridge and Terminal railroads; 63 m. s.w. of Pittsburgh, 141 m. e. of Columbus; popularly known as the 'Nail City.' It is the largest city in the state, and in commerce and manufactures one of the most important places in its region. The site is an alluvial plain, about 45 ft. above low water, from which the surface rises by hills and bluffs 650 ft. above sea-level. The environments are rich in agricultural land and bituminous coal measures. Besides its manufactures and other local industries, the city has a large general trade, exceptionally favored by its facilities for railroad and water transportation. In the year ending 1891, June 30, W. had 103 vessels of 10,747·75 tons enrolled and licensed in its custom-house, and 17 vessels of 2,622·78 net tons were built there during the year. A stone bridge crosses Wheeling creek; a suspension bridge connects W. with Zane's Island, in the Ohio; a costly bridge, with the second largest arch span on the continent, crosses the Ohio; and a fourth bridge was building 1892. The city has two sub-divisions—first, into 8 wards; second, as N., E., S., and Centre W., and Zane's Island. It is supplied with manufactured and natural gas and electric light plants, thorough sewerage, adequate water

WHEELMEN'S ASSOCIATIONS.

service, well-paved streets, and horse, steam, and electric street railways. The notable buildings include the U. S. custom-house, new city-hall and court-house, U. S. post-office, Y. M. C. A. building, Home for Aged Women, and the Wheeling Female College. In 1903 the city had a net public debt of \$479,302; aggregate real and personal property val. \$24,359,346; tax rate \$1 on \$100. In 1902, Sept., there were 2 nat. banks (cap. \$500,000), and several state banks; and 4 daily and a number of weekly and monthly periodicals. The public-school enrolment was nearly 7,000, teachers employed 143, public-school buildings 16, value of sch. property \$750,000. In 1890 there were 30 churches: Meth. Episc. 10; Presb. 4; Rom. Cath. 4; Luth. 3; Bapt. 2; German Independent 2; Prot. Episc. 2; German Ref. 1; Disciples 1; Hebrew 1.

The manufacturing establishments, which number more than 400 and yield products exceeding \$16,000,000 in value, include 5 steel and iron plants, with 9 blast furnaces, capacity 2,000 tons Bessemer pigs daily; 4 Bessemer steel works, cap. \$1,300,000, product 210,000 tons; 3 potteries, cap. \$700,000; 9 blast furnaces; 3 sheet and 2 bar mills; 6 cut and flint glass factories; several foundries and machine-shops; and hinge, beer and ale, axle, brick, woolen goods, cigar and tobacco, leather, harness, lantern, sheet steel, steel, gas, and steam pipe, metal coiling, tacks, and tin roofing plants. The first glass (window) factory was established 1821; the first cut-glass 1829; the first flint-glass 1835; the first iron-mill 1834; and the first nail-mill 1847.—W. was settled by three Zane brothers 1769; was long known as Zanesville; had the second strongest defensive works on the w. frontier, erected 1774, which withstood sieges or attacks 1777, 81, and 82; was incorporated as a town 1806; chartered as a city 1836; and was the state capital 1863–70 and 1875–85.—Pop. (1880) 30,737; (1890) 35,013; (1900) 38,878.

WHEELMEN'S ASSOCIATIONS: national, state, and other organizations of cyclers of both sexes, having constitutions and rules for annual contests. In 1892 there were two national assocs.—the League of American Wheelmen, organized at Newport, R. I., 1880, estimated membership 30,000; and the Century Road Club of America, organized at Chicago 1891, having 2,000 members, and founded for the sole purpose of governing road-racing.—The following gives the best American records in the different classes, to 1892, June 1: 10 m.; ordinary wheel, W. A. Rowe (1885, Oct. 19), 28 min. 37 $\frac{4}{5}$ sec.; 5 m.: safety, A. A. Zimmerman (1891, Sep. 21), 12 min. 52 $\frac{4}{5}$ sec.; 5 m.: tandem safety, W. F. and C. M. Murphy (1890, Sep. 2), 14 min. 5 sec.; path: 1 h., professional safety, W. A. Rowe (1886, Oct. 25), 22 m. 150 yds.; 2 h., professional, F. F. Ives (1886, Oct. 9), 39 m. 1,320 yds.; 3 h., professional, F. F. Ives (1886, Oct. 9), 54 m. 1,320 yds.; 24 h., professional, S. G. Whittaker (1887, Oct. 18), 322 m.; the same, amateur, Bert Meyers (1888, Nov. 22), 289 m.; road: amateur, 5 m., C. W. Dorntge (1891, Sep. 22), 13 min. 34 $\frac{2}{5}$ sec.; 20 m., the same rider and date, 53 min. 56 $\frac{2}{5}$ sec.; 50 m., R. G. Betts (1890,

WHEELOCK.

Oct. 19), 3 h., 20 min. 35 sec.; 100 m., the same rider and date, 7 h. 8 min. 37 $\frac{2}{5}$ sec.—Among the world's records, made in the United States, are: $\frac{1}{2}$ m., A. A. Zimmerman (1891, Sep. 9), 33 $\frac{4}{5}$ sec.; 1 m., W. W. Windle (1890, Sep. 15), 2 min. 25 $\frac{3}{5}$ sec.; tandem, 1 m., Murphy and Zimmerman (1891, Sep. 21), 2 min. 24 $\frac{1}{5}$ sec.; 4 m., Murphy brothers (1890, Sep. 2), 11 min. 12 $\frac{1}{4}$ sec.—The best English tandem tricycle records are: 1 m., Crump and Scheltema-Beduin (1891, June 25), 2 min. 31 $\frac{2}{5}$ sec.; 5 m., Wilson and Dangerfield (1890, June 20), 13 min. 54 $\frac{1}{5}$ sec.; tricycle, 1 m., G. Cassignard (1891, Oct. 18), 2 min. 28 $\frac{2}{5}$ sec.; 5 m., G. Turner (1890, June 25), 13 min. 50 $\frac{3}{5}$ sec.—See BICYCLE: CYCLING: TRICYCLE.

WHEELOCK, *hwē'łōk*, ELEAZAR, D.D.: educator: 1711, Apr. 22—1779, Apr. 24; b. Windham, Conn. He graduated at Yale 1733, studied for the ministry, was ordained, and became pastor of the 2d Congl. Church, Lebanon, Conn., where he remained 35 years. In 1754 he opened a school in his own house, and had among his pupils a Mohican Indian, Samson Occum (q.v.), whose rapid progress led to the establishing of a school for Indians. The Moor Indian Charity School at Lebanon was the result, and this school grew into Dartmouth College (q.v.), of which W. was the first pres. In 1766 Occum and Nathaniel Whitaker (q.v.) went to England, and obtained an endowment for the school of £11,000, which was placed in the hands of trustees. W., having secured a large grant of land from the royal gov., John Wentworth, removed the school to Dresden (now Hanover), N. H., 1770. The place was then a wilderness, and teachers and pupils suffered many privations; but W. continued to labor and preach as long as he lived. He published *Narratives of the Indian Charity School* and some sermons.

WHEELOCK, JOHN, D.D.; LL.D.: second pres. of Dartmouth Coll.: 1754, Jan. 28—1817, Apr. 4; b. Lebanon, Conn.; son of Eleazar W., first pres. He began his collegiate education at Yale; graduated in the first class at Dartmouth 1771; was tutor 1772-74; member of the provincial congress 1774, and of the colonial assembly 1775. In 1777, after serving as major in the N. Y. militia, he was made lieut.col. in the continental army; the next year he led a force against the Indians, and subsequently was aide-de-camp to Gen. Gates. On the death of his father 1779, he was elected pres. of Dartmouth, and taught civil and eccles. history. In 1783 he was wrecked off Cape Cod, and lost the money and books collected in Europe for the college. Owing to doctrinal and other disagreements with the trustees, he was deposed from the presidency 1815, but reinstated 1817. Half his estate he willed to Princeton Theol. Seminary. He was author of *Sketches of the History of Dartmouth College* (1816).

WHEEL-WORK.

WHEEL'-WORK: combination of toothed and other wheels by which motion is conveyed. Combinations of this sort are familiar to every one, and have been in use since the days of Archimedes (q.v.), and probably for many centuries before his time. It is only in modern times, however, that the action of such wheels has been critically examined and understood. To a superficial observer the action appears extremely simple: a tooth of the driver pushes against a tooth of the driven wheel, thereby causing that wheel to turn round; and, since by this turning the teeth must become disengaged, it is requisite that, before one tooth let go, a second tooth of the driver be ready to take hold of another tooth of the driven wheel. For this purpose it is enough that the distances between the teeth on the two wheels be alike; in other words, that the diameters be proportioned to the number of the teeth.

When two unequal wheels act on each other, the smaller one turns faster than the larger. Thus, if a wheel with 60 teeth work into one of 20, the latter will turn 3 times as quickly as the former; and it is on this principle that the trains of clock-work are arranged. For example, the *great-wheel* of a common house-clock may have 180 teeth, and may drive a smaller wheel, or *pinion* as it is called, of 15 leaves, and in this case, if the great-wheel turn once in 12 hours, the pinion must turn once in every hour; the axis of this pinion carries the minute-hand. On the same axis the *hour-wheel* is fixed, which may have, say, 96 teeth, and may drive a pinion of 12 leaves. This pinion, then, must turn 8 times per hour, or once in $7\frac{1}{2}$ minutes. On the same axis with this last-mentioned pinion there is fixed the *third-wheel*, having, perhaps, 75 teeth; and this drives a pinion of 10 leaves, which, turning $7\frac{1}{2}$ times as fast, must make one turn per minute. On the axis of this last pinion the *escape-wheel* is fixed. This escape-wheel has 30 teeth, each tooth acting twice upon the pendulum, thus making 60 beats per minute. In such a case as this there is no difficulty in arranging the numbers of the teeth, and these may be varied in many ways, provided the proper proportions be kept. But in other cases considerable skill, and often much labor, is requisite for discovery of the proper numbers. Thus, if it be wished to indicate the moon's age on the dial of a clock, there must be an index turning once in the time between new moon and new moon. This time, which astronomers call a *lunation*, averages 29 days, 12 hours, 44 minutes, and nearly 3 seconds (2^h85^m3^s), and it is far from easy to ascertain what number of teeth will produce this motion. The month-wheel would need to turn rather more than 59 times as slowly as the great-wheel of the clock; and if the mean lunation had been $29\frac{1}{2}$ days, without the odd 44 minutes, the thing could have been managed by making a pinion of 8 teeth lead a wheel of 59 teeth, on the axis of which another pinion, say of 10 teeth, is fixed, and made to work a wheel of 50 teeth. But then such an arrangement would go wrong nearly three quarters of an hour every month, and in three years would indicate new moon a day too early. In order to ob-

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tain a better train, we may compute the number of days in 2, 3, 4, 5 lunations, until we get nearly a number of half days. Now, 16 lunations consist of 472 days, 11 hours, 45 minutes, or almost exactly 945 turns of the great-wheel. This proportion can be obtained by causing a pinion of 12 teeth to lead a wheel of 81 teeth, and another pinion also of 12 teeth to lead a wheel of 105 teeth. This arrangement gives an error of one-quarter of an hour in 16 months, or hardly an hour in 5 years. If still greater precision be required, we must carry the multiples further: 33 lunations make 974 days 12 hours $13\frac{1}{2}$ minutes, or 1,949 turns of the great-wheel of the clock; but then this number 1,949 has no divisor, and it is quite impracticable to make a wheel of 1,949 teeth; so that we must continue our multiples in search of a better train. In this way, when great exactitude is desired, an unexpected amount of labor is often encountered. For reducing this labor, the method of continued fractions is employed, and the toil is further lessened by use of tables of divisors.

Such calculations have to be made for the construction of orreries, by which the times of the revolutions of the planets are shown; also engineers have to make them, as when a screw of a particular pitch has to be cut. If, e.g., we have to cut a screw of 200 turns to the French mètrè on a lathe having a leading-screw of 4 turns to the English inch, the axis of the lathe must make 50 turns while the screw makes 39 and a fraction, since the mètrè is 39.37079 inches. By applying the method of continued fractions, we discover that for 2,225 turns of the lathe-spindle there must be 1,752 turns of the screw; and as these numbers can be reduced into products—viz., 2,225 into $5 \times 5 \times 89$, and 1,752 into $2 \times 2 \times 2 \times 3 \times 73$ —we can easily get trains to produce the required effect. From these illustrations it is apparent that the computation of the trains of wheel-work is intimately connected with the doctrine of prime and composite numbers.

The general sizes of the wheels and the number of the teeth having been decided, the next business is to consider the shape which those teeth ought to have. Now, for the smooth and proper action of machinery, it is essential that the uniform motion of one of the wheels be accompanied by a motion also equable of the other wheel. Two curves have been known to give this quality of equable motion—viz., the epicycloid, formed by rolling one circle on another, and the involute of the circle, traced by the end of a thread which is being wound upon a cylinder, or unwound from it. But the general character of all curves which possess this property has been only lately examined. If it were proposed to construct two wheels which shall have their centres at the points A and B (fig. 1), and the one of which may make 5 turns while the other makes 3, we should divide the distance AB into 8 parts, and assign 5 of these for AC, the radius of the one wheel, the remaining 3 parts for the radius BC of the other wheel. Wheels made of these sizes, and rolling on each other, would turn equably; and if the circumferences be divided into 5 and 3 parts re-

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spectively, the points of division would come opposite to each other as the wheels turned. The circumferences of these circles are called the *pitch-lines*, and the portions of them included between two teeth are called the *distance of the teeth*: the distance or arc CD on the one wheel must be equal to the distance CE on the other wheel, in order that the motion may bring the two points D and E together. For a reason that will appear in the sequel, we cannot use

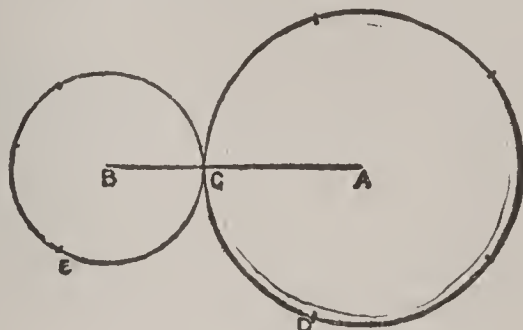


Fig. 1.

wheels with so few as 3 or 5 teeth, and therefore we subdivide the distances CD and CE into some number of parts, say 4, and thus obtain wheels of 20 and 12 teeth instead. Since the tooth of the one wheel must necessarily come between two teeth on the other, the distance between the teeth must be halved, the one half being given for tooth, and the other half for space.

Having then divided off the pitch-line of the wheel B, as in fig. 2, CD being the distance of the teeth, CG the half-distance, let us sketch any contour, CFGHD, for the shape of a tooth, and let us examine what should be the characters of this outline. First, the form of this outline must be repeated for each tooth; secondly, the line should be symmetric from the top, F, of the one to the top, I, of the next tooth, in order that the wheel may be reversible face for face. These obvious conditions having been attended to, let us cut, in thin sheet-brass or other convenient material, a disk having this outline, and let us pin its centre at the point B. Having prepared a blank disk on which the outline of A is to be traced, let us slip it under the edge of the previous one, and pin its centre at the point A. If, now, B and A being held fast, we trace the outline of B upon A, we move each of them slightly, but in the proper proportion forward, and make a new trace upon A, and so continue as far as needed, we shall obtain a multitude of curve-lines marked upon A. The line which envelops and touches all these curves is,

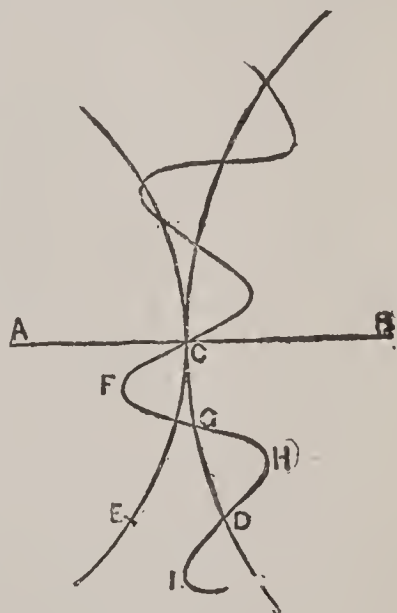


Fig. 2.

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obviously, the proper outline for the wheel A; and thus it appears that, whatever outline, within reasonable limits, may have been assumed for the teeth of B, it is always possible, by a geometrical operation, to discover the proper corresponding form for the teeth of A. These forms may be called *conjugate* to each other, inasmuch as that, if the disk A were now cut out and used as B has been, the identical form of B would be reproduced.

We may obtain a whole series of wheels, A' , A'' , A''' , etc., from the same original B; and from A, as an original, we may obtain another series, B' , B'' , B''' , etc., having various numbers of teeth. And it has been shown that any wheel of the series A will work accurately with any one of the series B. So far well; but then the wheel A of 20 teeth may not be like the wheel B of the same number of teeth. It becomes, therefore, a desideratum to choose the form of the teeth of B in such a manner that its conjugate of the same number of teeth may have the same form; by such an arrangement, we shall obtain a series of wheels, any one of which will work with any other.

If the number of the teeth of B be augmented indefinitely, the outline of the pitch-line will become nearly straight; and so drawing through C (fig. 3) a straight line to touch the pitch-line of A, we shall have the pitch-line of the straight rack, as it is called, which could be worked by any wheel of the series A. The reverse of this rack would work with any one of the series B; therefore, if the series A and B be identical with each other, the rack must be its own reverse. Thus we obtain a very important general result—viz., that if we mark off along a straight line distances, CD, equal to the desired interval between the teeth, and then draw any line CKLMD, consisting of four equal parts, CK, KL, LM, MD, symmetrically arranged, all the wheels obtained from this, as the original, will work into each other; moreover, the forms thus obtained answer for internal as well as external teeth.

Being then at liberty to choose any line whatever, subject to the above condition of symmetry, for the figure of the straight rack, we may inquire whether it may not be arranged so as to bring about other desiderata. This line, it may be noted, is not necessarily curved; it may be composed of straight lines, or partly of straight and partly of curved lines.

The general appearance of this wavy line recalls that curve known as the curve of sines, which, indeed, is the simplest known curve, consisting of equal and symmetric undulations, and unlimited in extent. By changing the ordinates in any ratio, say in the ratio of PQ to PR, the waves of the curve may be made shallower or deeper; and on studying the effects of such a change, we discover

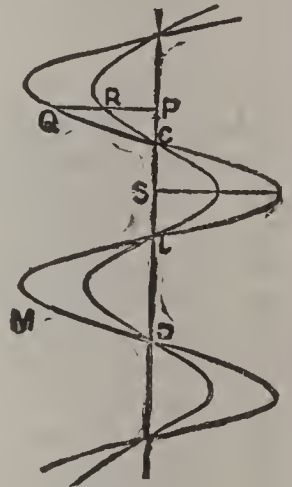


Fig. 3.

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some new and very important laws concerning the contacts of the teeth of wheels.

Beginning with the curve of sines *proper*, in which the greatest ordinate, SK, is equal to the radius of a circle of which CD is the length of the circumference, it is found that wheels traced from it can touch each other at only *one* point: of course such wheels cannot work, because the solitary contact is now on the back and now on the front of the tooth. In this case the contour of the tooth crosses the pitch-line at an angle of 45° . On deepening the teeth, still keeping to the same kind of curve, it is found that the wheels begin to touch at more points than one; and when they are made so deep as that the contour crosses the

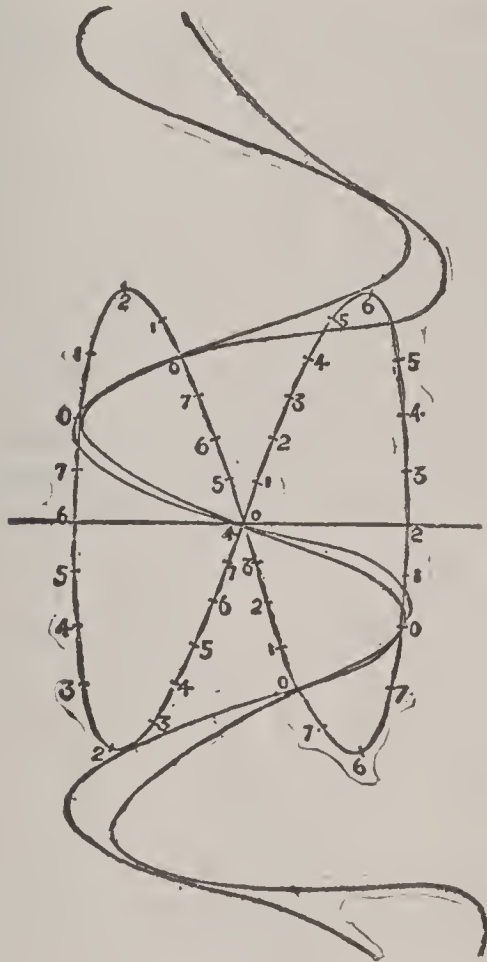


Fig. 4.

pitch-line at an angle of 65° , there are always three contacts, neither more nor less. If the teeth be still further deepened, the contacts become more numerous; they appear and disappear in pairs, so that with an inclination of, say, 68° , there would be sometimes three and sometimes five contacts. When it becomes $70^\circ 17'$, there are always five; and with an inclination of $73^\circ 11'$, there are always seven points in contact at once.

Of these points of contact, some are on the sides of the teeth, and others are near the top and bottom: the latter, on account of the obliquity of their action, are of no use in driving; they may be called supplementary, and their number is always one less than the number of useful or working contacts. In the system of seven contacts, four

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are useful, two of them being forward, and two backward, so that two teeth are always in action at once—an arrangement by which a gradual improvement in the equality of the teeth is secured by their wearing.

When two properly formed wheels are put into motion, the points of contact move also, and describe a peculiarly shaped line, the nature of which depends on the character of the primary form adopted for the tooth of the straight rack. Conversely, if this path of the points of contact be first assumed, and the law of motion in it be observed, the form of the tooth of any wheel may thence be obtained; and this leads us to the most convenient way of making the delineation.

In fig. 4, the form of the straight rack and the corresponding shape of the teeth of a wheel of 20 are shown in contact, the depth of the tooth being such as to give five contacts, which in the drawing are at the five points marked 0. If we suppose the rack to be slid upward, carrying the wheel with it, the points of contact will change; and when the motion has been one-eighth part of the interval between two teeth, these points will occupy the positions marked 1. When a motion of another eighth is made, the two upper contacts on the left hand merge into one, and are about to disappear; at the same instant, two new contacts begin at the lower point, marked 2; and thus the motion continues in the order of the numbers marked along the peculiarly shaped path of the points of contact. Those contacts which occur along the crossing lines of the

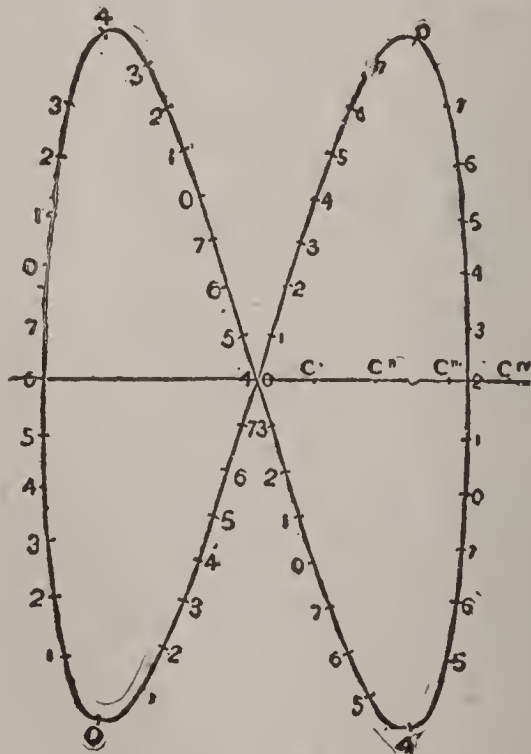


Fig. 5.

curve are working contacts; those which occur along the two external arcs are supplementary. When the form of this path and the positions of the successive points in it have been obtained by calculation, the outline of any wheel is easily traced geometrically. Figs. 5, 6, and 7 show the

WHEEL-WORK.

path for the system of seven contacts; fig. 5 when the outline of the rack is the curve of sines, fig. 6 when the teeth of the wheels have the involute, and fig. 7 when they have

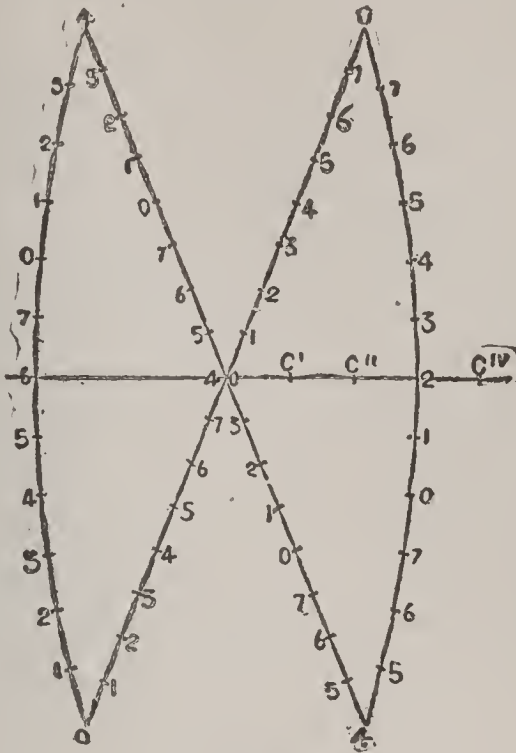


Fig. 6.

the epicycloidal form. In these figures, C' , C'' , C''' are the positions of the centres of wheels of 1, 2, 3 teeth.

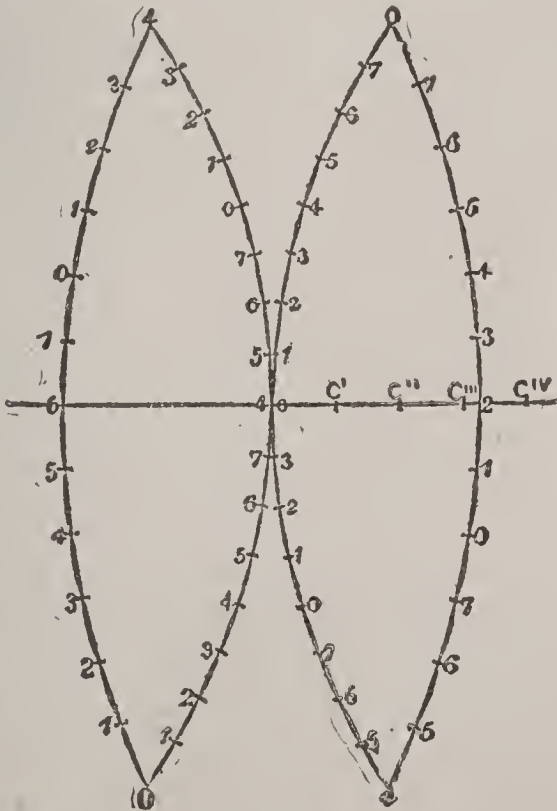


Fig. 7.

In well-constructed machinery there should never be fewer than seven contacts in the system, since of these only four are working; and therefore only two teeth are

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fully engaged; and it is necessary that two teeth be engaged at once, in order that the wearing may tend to remove any unavoidable inequalities of workmanship.

When we attempt to delineate the forms of wheels with few teeth by help of any of these orbits, we find that the contours overlap each other; in such cases the following tooth of the conjugate wheel effaces, as it were, the trace belonging to the preceding tooth; and the contacts, though still holding good of the geometrical curves, become mechanically impossible. Thus it is that there are limits below which we cannot go in the numbers of the teeth. If the overlapping occur at the shoulder of the tooth, some of the useful contacts are lacking; but when the replication is only at the point of the tooth, the want of the supplementary contact occasions no inconvenience. An examination of the different cases shows that with seven contacts the smallest numbers which can be used on the three systems just mentioned are 19, 17, and 11, so that the system of epicycloidal teeth has, in this respect, the advantage over the others. Clock pinions, then, should not have fewer than eleven leaves.—See *A New General Theory of the Teeth of Wheels* (Edinburgh 1852).

It remains to cut the actual wheels to the shapes thus formed. The essentials of the operation are these: The blank wheel is attached to the axis of a large divided circle, which can be turned round and held in any desired position. A cutter, generally a revolving cutter, is brought down on the blank, so as to notch out the space between two teeth; this done, the circle is turned round by the proper number of divisions, and another space is cut; and in this way the whole circumference of the wheel is gone over. In order that the work be well done, it is essential that the cutter be truly shaped; and when the edges become blunted by use, it is difficult to avoid spoiling the shape in the resharpening. Whatever system be followed, the form of the tooth varies from one number to another, so that the cutter which answers for a wheel of 20 cannot suit one of 30 teeth; hence, when accurate results are wanted, there must be a cutter for each wheel. In order to avoid the expense of so many cutters, each requiring to be carefully made, the slovenly practice is often followed of having, perhaps, two cutters, one to be used for pinions, the other for wheels; and the result is the intolerable noise so common in mills, and which indicates unnecessary expenditure of power.

When, as in the wholesale manufacture of clocks and watches, multitudes of wheels are to be cut of one size, careful attention can be given to the shape of the cutter. The labor is economized by binding a considerable number of blanks together on the dividing-engine, and plowing out the teeth of the whole of them at once. For the small wheels, technically called pinions, which cannot conveniently be fixed on the dividing-engine, *pinion-wires* are used; these are wires of brass or steel drawn through holes of the proper shape, and having the leaves running all along them. The watch-maker removes the leaves from those parts

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where they are not wanted, and thus obtains the pinion and its axle in one piece; in this way he gains the advantages of solidity and economy of workmanship.

Among the many purposes to which wheel-work is applied, it happens sometimes that an unequable motion is wanted. Thus, in the construction of an orrery, it is desirable that while one index turns uniformly to show the time, another may turn so as to show the unequal motion of the sun in the ecliptic. In that case the variations of the velocity are small, and it is enough to divide the teeth unequally, as the slight inequality can hardly affect the working of the apparatus. But when the changes of velocity are considerable, the matter must be more carefully considered. If we suppose the pitch-lines of two wheels to be uneven, and to roll on each other without regard to the positions of their centres, the forms of teeth to be arranged on those pitch-lines may be traced out almost in the manner above explained for round wheels. The pitch-line must be divided into equal distances, and the disk must receive a half-sliding, half-turning motion, so that the pitch-line may pass through the point *C* (fig. 8) always perpendicularly to the line *AB*, which is the line of centres for round wheels. The combination of this motion with the proper motion of the points of contact gives true forms for the teeth.

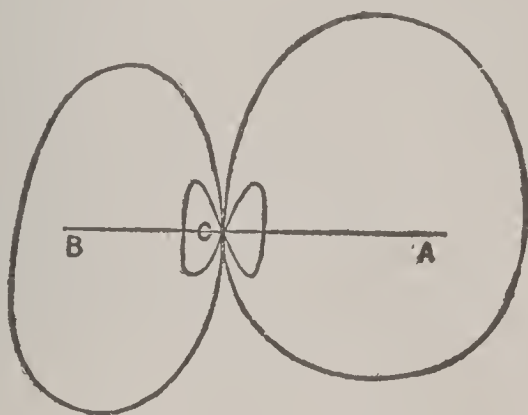


Fig. 8.

Thus the form of the tooth can be obtained when that of the pitch-line is known. Now, when two disks, turning on fixed centres, touch each other at any point out of the straight line joining these centres, there is a slipping of one surface over the other; therefore, in order that the pitch-lines may roll together, they must be so shaped that the point of contact may be in the line of centres. It can be shown that, for any assumed contour of the wheel *A*, another contour, having its centre at *B*, and rolling on *A*, is possible. But, except in one or two special cases, the working out of the problem has not been accomplished. It is enough here to mention the single case of elliptic wheels. The action of these is founded on the well-known property of the ellipse, that the sum of the distances of any point in it from the two foci is constant, and that the curve makes equal angles with these two lines. Hence two equal ellipses turning on their foci, when their centres are at a

WHEEL-WORK.

distance equal to the major axis of the ellipse, will roll on each other; and teeth formed on these as pitch-lines will work perfectly. In fig. 9, the ellipses have their major and minor axes in the proportion of 5 to 4; with that proportion the focus is at one-fifth part of the major axis from

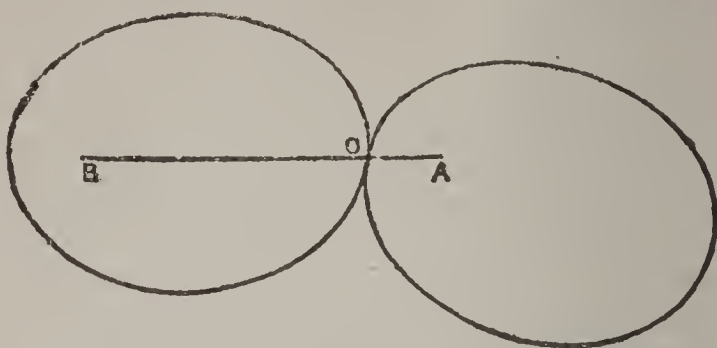


Fig. 9.

one end; therefore B, at one part of the revolution, moves four times as rapidly—at another part, four times as slowly—as A.

Sometimes one of the wheels has to be quite at rest during part of the motion of the other wheel. This is accomplished by causing some part of the wheel that is to be stationary, to bear on a part of the circumference of the moving-wheel which is concentric with its axis. This is exemplified in the arrangement for counting wheels in fig. 10. The object of this apparatus is to count and record the revolutions of the wheel B. As this wheel turns round, a pin E attached to it enters into the slit GH, and thus carries the wheel A round as long as the pin remains in the slit—that is, until the slit GH be brought into the position IK. As soon as E leaves the slit at I, there would be no further connection between the two wheels, and A could be moved altogether independently of B. In order to prevent this, the disk B is made nearly five-sixths entire, and parts of A are scooped out between the slits so as to receive and to fit B. By this means A is prevented from being turned either forward or backward until the pin E again come into one of the slits. When this happens, the projecting part at G finds room in the recess F. If there be seven slits, GH, round the wheel A, and if B turn once in 24 hours, an index attached to A would show the days of the week; and the index might be made to be stationary all day, the change being effected during the night. An example of this kind of interrupted motion is seen in the ordinary dead-beat clock escapement, in which the detaining

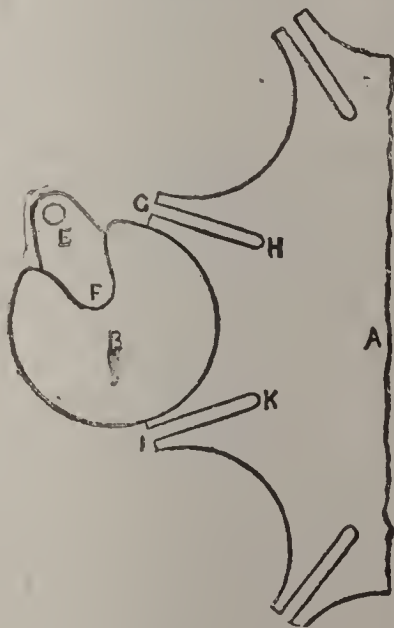


Fig. 10.

surface of the pallet is concentric with the axis of the crutch.

When the axes are inclined to each other, *bevelled* wheels

WHEELWRIGHT—WHEEZE.

are used. Just as common wheels may be regarded as fluted cylinders, bevelled wheels may be described as fluted cones having a common apex. The principles which regulate the formation of the teeth of these are the same as for plane wheels; but the application of these principles is considerably more intricate. Since both the teeth and the spaces between them are tapered, it is impossible to notch out the intervals by means of a revolving cutter. Attempts have been made to construct machinery for planing the teeth by means of a cutter moving in a line toward the apex of the cone; but the complexity of the apparatus, and the slowness of the process, have prevented its introduction: thus the accurate formation of bevelled wheels has still to be accomplished by hand.

WHEELWRIGHT, *hwēl'rit*, JOHN: colonial Congl. minister: 1594–1679, Nov. 15; b. in Lincolnshire, England. After graduation at Cambridge, he ministered in the Established Church at Alford until 1636, when he was expelled by Abp. Laud, and, emigrating to New England, was pastor in Braintree, Mass. Sympathizing with the opinions of his sister-in-law, Anne Hutchinson (q.v.), he came into a conflict with the associate pastor of the Boston church (of which his was a branch), and he was banished from the colony on an ill-founded charge of seditious preaching. In 1638 he founded the town of Exeter, N. H.; and when that was claimed as within the bounds of the colony, he removed to Wells, Me. In 1644 he was readmitted to the colony, and lived in Hampton, N. H., visiting England 1657–60, after which he was pastor in Salisbury, N. H., where he died. He published a vindication 1654.

WHEELWRIGHT, WILLIAM: promoter of Central and S. American enterprises: 1798–1873, Sep. 26; b. Newburyport, Mass.; descendant of the Rev. John W. At the age of 19 he commanded a vessel sailing to Rio Janeiro, and at 26 was U. S. consul at Guayaquil. Five years later he began to establish lines of steamers on the w. coast of S. America, resulting in the formation of the Pacific Steam Navigation Company; and his enterprises included coal mines, railroads, and the first telegraphs and gas and water works in S. America. He gave largely to benevolence, and at his death in London left \$100,000 for a scientific school in Newburyport. A bronze statue was erected to his memory in Valparaiso. He published a book on his steamship enterprise 1838, and *Observations on the Isthmus of Panama* (1844).—His life (in Spanish by Alberdi) was transl., Boston, 1877; also sketched by John Codman 1888.

WHEEN, n. *hwēn* [AS. *hwæne*, somewhat]: in *Scot.*, a number, as a *ween* of children; a *ween* of potatoes.

WHEEZE, v. *hwēz* [AS. *hwæsan*, to breathe with difficulty: Icel. *hwasa*; Dan. *hwæse*, to wheeze, to hiss]: to breathe with difficulty and with an audible sound. **WHEEZ'ING**, imp.: N. the act of breathing hard with noise, produced by obstruction of the air-passages; the noise made by such breathing. **WHEEZED**, pp. *hwēzd*. **WHEEZ'Y**, a. -ī, breathing audibly and with difficulty.

WHELK.

WHELK, n. *hwœlk* [AS. *weolc*, a whelk, a shell-fish]. **a** shell-fish; a small spiral-shaped univalve; gasteropodous mollusk of the genus *Buccinum*, family *Buccinidæ*. The shell is ovate, turreted, and more or less ventricose; its mouth ovate, emarginate, or produced into a very short canal below, outer lip expanded, inner lip usually thin and smooth within. The operculum is horny. The animal has a broad head, with two tentacula, with whose base the stalks bearing the eyes are united; the proboscis is large, and the tongue armed with teeth, used for rasping substances used for food—almost any animal substance being welcome for this use—or for perforating the shells of other mollusks in order to prey upon them. There are about 20 known species, found chiefly on the coasts of colder parts of the world. The commonest species on our coast is *B. obsoletum*, abundant on tide-flats; it averages 1 in. in length, is brown in color, often covered with black slime, and the animal is a good scavenger in its feeding. Another common species is *B. trivittatum*, greenish white, often with three bands on the largest whorl. The **COMMON W.**, or **BUCKIE** (*B. undatum*), is found on both sides of the Atlantic; and at Cape Ann, Mass., is called **Periwinkle**, a name applied also to two larger shells on our eastern coast, *Fulgur* and *Sycotypus*. It occurs from low-water mark to a depth of 100 fathoms, is sometimes three inches in length, grayish or brownish white, with numerous raised ridges and spiral



Whelk (*Buccinum undatum*): *a*, the eggs.

atriæ. It is much used as food, is cooked simply by boiling, and eaten usually with vinegar and pepper. Great quantities are consumed in London, chiefly by the poorer classes. In former times, whelks appear to have been more esteemed for food than now. Eight thousand of them were provided for the enthronization feast of William Warham, Abp. of Canterbury, 1504. The whelks brought to the London market are obtained mostly by dredging. On the coast of Galloway, where they are used as bait for cod, they are procured by letting down baskets containing pieces of fish in about ten fathoms water: the baskets, taken up next day, contain many whelks, which have crept into them to feed on the garbage.—The name **W.** (or *Wilk*) is popularly given in Scotland to the **Periwinkle** (q.v.), the **W.** being known by that of *Buckie*.—There are more than 100 fossil species of **W.** in the Miocene formations.

WHELK—WHERE.

WHELK, n. *hwēlk* [from **WHEAL** 1, which see]: a pimple. **WHELKED**, a. *hwēlkt*, covered with pimples.—*Whelk* or *Bubucle* is the name used by old writers for the cutaneous disorder now commonly known as *Acne* (q.v.). The simple whelk, the black whelk, the inveterate whelk, and the crimson whelk correspond to *Acne simplex*, *A. punctata*, *A. indurata*, and *A. rosacea* of the more modern dermatologists. The symptoms of the crimson whelk, or, fiery-face, must have been carefully observed by Shakespeare before he could have written Fluellen's graphic description of Bardolph: 'His face is all bubukles, and whelks, and knobs, and flames of fire, but his lips plows at his nose; and it is like a coal of fire, sometimes plue, and sometimes red.'—*King Henry V.*, act iii. sc. vi. The *Chin-whelk* is now known as *Sycosis* or *Mentagra*.

WHELM, v. *hwēlm* [*whelm* and *overwhelm* are probably the same as OE. *whelven* and *overwhelven*, used almost in same sense: Sw. *hwalm*, a hay-cock, connected with *hwalf*, an arch—*whelm* thus meaning, originally, to arch over: hence, to overturn]: to cover with water or other fluid; to immerse deeply; to overburden; to plunge in utter destruction. **WHELM'ING**, imp. **WHELMED**, pp. *hwēlmd*.

WHELP, n. *hwēlp* [Icel. *hvelpr*; Dut. *welp*; MHG. *welf*, the young of dogs, lions, bears, etc.]: the young of a dog, a lion, a fox, etc.: a puppy; a young man or youth, in contempt: V. to bring forth young, as a bitch, etc. **WHELP'ING**, imp.: N. the act of bringing forth young. **WHELPED**, pp. *hwēlpt*. **WHELPS**, n. plu. short upright pieces around the barrel of a capstan to give resting-points for the messenger or hawser.

WHEN, ad. *hwēn* [AS. *hwænne*; Ger. *wann*, *wenn*; Goth. *hvan*, when]: at what time; at the time that; though at the same time; which time: CONJ. while; whereas. **WHEN'AS**, in OE., at the time when; what time. **WHENEV'ER**, ad. *-ēv'ēr*, at whatever time; also **WHEN'SOEV'ER**, ad. *-sō-ēv'ēr*, at what time soever.

WHENCE, ad. *hwēns* [OE. *whennes*; AS. *hwanon*, whence: Ger. *wannen*]: from what place; from what or which source or origin; how. **WHENCE'SOEV'ER**, ad. *-sō-ēv'ēr*, from what place, cause, or source soever. FROM **WHENCE**, a common phrase for **WHENCE**.

WHERE, ad. *hwār* [AS. *hwar*, *hwær*; Icel. and Goth. *hvar*; Dan. *hvor*; Dut. *waar*, where]: at what place; in what situation; at the place in which; to what or which place; in OE., whence; also used as a conjunction, whereas. **ANYWHERE**, at any place. **WHERE'ABOUT**, ad. near what or which place; with reference to which. **WHERE-ABOUT**, or **WHERE'ABOUTS**, n. place where some one or something is to be found or sought for; lodging; place of residence. **WHEREAS'**, conj. when in fact or truth; the thing being so that; while on the contrary; in OE., at which place. **WHEREAT'**, ad. at which; at what. **WHERE-BY'**, ad. by means of which; by what. **WHEREFORE**, ad. and conj. for which reason; why. **WHEREIN'**, ad. in which; in what. **WHERE'INTO'**, ad. into which. **WHEREOF'**, ad.

WHERRY—WHEWELL.

of which; of what. **WHEREON'**, ad. on which. **WHERE'SOEV'ER**, ad. in what place soever. **WHERE'THROUGH**, ad. in *OE.*, through or on account of which. **WHERE'TO'**, ad. to which. **WHERE'UNTO'**, ad. to which; to what. **WHERE'UPON'**, ad. upon which. **WHEREV'ER**, ad. at whatever place. **WHEREWITH'**, ad. with which; with what; also **WHERE'WITHAL'**, ad.

WHERRY, n. *hwēr'ri* [perhaps Gael. *curach*; W. *cwrragh*, a wherry, a skiff]: a light row-boat, sharp at each end for speed; a ferry-boat; a small half-decked fishing-vessel. **WHER'RYMAN**, n. the rower of a wherry.

WHET, v. *hwēt* [*AS.* *hwæt*; *Icel.* *hvatr*, sharp: Ger. *wetzen*; Dut. *wetten*, to whet, to sharpen]: to sharpen, as a razor, a knife, sickle, or the like, by rubbing or by friction on a stone or some other suitable substance; to excite or stimulate, as the appetite; to make keen; in *OE.*, to make angry or acrimonious: N. the act of sharpening by friction; something that whets or stimulates. **WHET'TING**, imp. **WHET'TED**, pp. **WHET'TER**, n. *-tēr*, one who or that which whets; in *OE.*, one who tipsples. **WHETSTONE**, any hard fine-grained stone used for sharpening knives, etc.; a hone (see **HONES**). **WHETSLATE**, a variety of slate used for whetting.

WHETHER, conj. *hwēth'ēr* [*Goth.* *hvathar*; *AS.* *hwæther*, which of two: *AS.* *hwō*, who]: a word used to introduce the first of two or more alternative clauses, the second being introduced by *or*, as, resolve *whether* you will or not; sometimes the second alternative clause is omitted, as, I do not know *whether* he has come (or not): **PRON.** in *OE.*, which of two—used interrogatively and relatively.

WHEW, interj. *hwū*: a sound expressing astonishment, aversion, or contempt.

WHEWELL, *hū'el*, **WILLIAM**, D D.: 1795–1866; b. Lancaster, England. He entered at Trinity College, Cambridge, and graduated (second wrangler and second Smith's prizeman) B.A. 1816. He became a fellow and afterward a tutor of Trinity, where also, for many years, he acted as a 'coach,' or private tutor. In 1820 he became a fellow of the Royal Soc.; was prof. of mineralogy in Cambridge 1828–32; prof. of moral theology, or casuistry, 1838–55. In 1841 he was appointed master of Trinity; in the same year he was pres. of the Brit. Assoc.; also for a time pres. of the Geological Soc. In 1855 he became vice-chancellor of the Univ. of Cambridge.

W. produced several text-books on mathematical subjects; one of which, *Dynamics* (1823), is still deservedly admired. He contributed a variety of papers to the Transactions of learned and scientific societies, and to scientific journals, and reviews. Later in life he concentrated his powers mainly on large works. Among the most important are: *Astronomy and General Physics considered in Reference to Natural Theology*, being the third Bridgewater Treatise (Lond. 1833); *History of the Inductive Sciences, from the Earliest to the Present Times* (3 vols. Lond. 1837);

WHEWELL.

The Philosophy of the Inductive Sciences, founded upon their History (2 vols. Lond. 1840); *The Elements of Morality, including Polity* (Lond. 1855). Among his other works were translations from the German and the Greek, and many essays. His last composition, so far as known, was an attack on Comte and Positivism, which appeared in *Macmillan's Magazine* after his death.

W.'s acquisitions were most various; it would have been sufficient occupation for the lives of most bookworms to have made them. His writings, again, were so various and voluminous that it might be thought sufficient employment of the life of a mere clever book-maker to have produced them. W. was neither bookworm nor book-maker. A clear-headed student, he was always increasing his stock of knowledge; a vigorous and independent thinker and writer, he was always giving forth the results of his studies to the public; and having thus proceeded during a long life of almost uninterrupted good health, he may be taken as illustrating what at the best may be achieved by a man of ambition, ability, and unflagging industry without genius. He was nowise superficial, like many pretenders to encyclopedic knowledge; he was really master of all that could be learned on a great many subjects. It has been said of him, 'knowledge was his forte, omniscience his foible;' but it is absurd to suggest that a man can have and strain after too much knowledge, if it be, as his was, thorough knowledge. His chief ambition was to grasp, survey, and co-ordinate the sciences; and he did excellent service both to science and history in the effort to gratify it. The task suited one of his extraordinary acquisitions, good sense, and philosophic comprehension. Had he been a man of more imagination and ingenuity, he might, of course, have been better employed in endeavoring to advance some single science: as he was, this was beyond him.

W. was a large, strong, erect man, with a red face and a loud voice. He was an effective preacher and lecturer, though in both characters lacking that 'something' which wins and rivets the hearer. He was accused of being arrogant; and his general bearing gave color to the charge. A story, long current, illustrates at once his varied knowledge and his personal relations to his brother fellows. He used so to overwhelm with his learning the company at the fellows' table, that a conspiracy was formed to put him down. Some fellows got up a knowledge of Chinese music from scattered articles in old reviews, with which they presumed W. would be unacquainted. They then made Chinese music the subject of, as it were, a casual conversation at table. For a time, contrary to his usual habit, he took no part in the conversation. When they had about exhausted themselves, he remarked: 'I was imperfectly, and to some extent incorrectly, informed regarding Chinese music when I wrote the articles from which you have drawn your information.' They were caught in their own trap, and had to submit to be instructed.—See Todhunter's *W.* (1876), and *Life* by Mrs Stair Douglas (1881).

WHEWER—WHIFFING.

WHEWER, n. *hwū'ér*: the widgeon.

WHEY, n. *hwā* [AS. *hwæg*; Dut. *wei*, whey: connected with Goth. *vato*, water]: in *cheese-making*, the thin, sweet, watery part of the milk remaining after the separation of the curd; the serum of milk. **WHEY'EY**, a. -*i*, or **WHEY'ISH**, a. -*ish*, resembling whey; white; thin.—*Whey* is the straw-colored fluid which remains on the surface when the casein of milk has been coagulated by addition of some coagulating substance and falls in flakes and clots to the bottom. Cheese-making affords the principal source of whey, which, thus obtained, forms, like buttermilk, a valuable kind of drink. The whey of goat's milk is regarded as specially beneficial, and in Switzerland and elsewhere are large establishments for applying the *whey-cure*, either alone or in association with the *grape-cure*. There can be no doubt that, were the cases judiciously selected, much good, in the way of eliminating morbid matter, might be effected in a few weeks by confining the patients to a diet of brown bread, grapes, and whey; while, on the other hand, many diseases might be much aggravated by that treatment. In ordinary medicine are recognized several useful varieties of whey, as white-wine whey, prepared by addition of sufficient sherry to a tumbler of heated milk to coagulate the casein. On decanting off the whey from the curds, and sweetening, a favorite sudorific draught is obtained—taken at bed-time for incipient cold in the head. *Cream-of-tartar whey* and *nitre-whey*—the former prepared by boiling 100 grains of cream of tartar in a pint of milk, and the latter by the similar use of nitre—act in the same way as wine-whey, but more powerfully. For *tamarind whey*, see **TAMARIND**.

WHICH, rel. and interrogative pron. *hwīch* [Goth. *hveleiks*, what-like: Dut. *welk*; Fris. *hwelik* or *hwek*, which: AS. *hwīlc*, which—from *whi*, why, and *lik*, like]: the so-called neuter of who; an interrogative, equal to 'what one' (of all these), as, *which* do you want? *which* is the house? a word used when referring to something going before (hence called the *antecedent*), as a place, animal, thing, or even a phrase, as, the dog *which* barks; he asked a high price, *which* perhaps was natural: used as an indefinite pronoun, and nearly equivalent to 'any one' (of the whole number or lot), as, take *which* you will. **WHICHEV'ER**, rel. -*ēv'ér*, or **WHICH'SOEV'ER**, rel. -*sō-ēv'ér*, whether one or the other; which.

WHIFF, n. *hwīf* [imitative of the sound of blowing, like *puff*, *huff*, or *fuff*: W. *chwiff*, a whiff; *chwaff*, a quick gust: Dan. *vift*, a puff]: a sudden breath of air or fume, as from the mouth; a slight blast or gust; a puff: V. to throw out in slight puffs of air or fume; to emit with whiffs, as in smoking; to puff. **WHIFFING**, imp. **WHIFFED**, pp. *hwīft*.

WHIFFING, n. *hwīf'fing*: trolling with a hand line; the hand-line used in this kind of fishing.

WHIFFLE—WHIG AND TORY.

WHIFFLE, *v.* *hwif'fl* [from **WHIFF**, which see: Dut. *weyfelen*, to waver, to be inconstant]: to be fickle and unsteady; to veer about; to breathe unsteadily; to blow in gusts; to trifle; in *OE.*, to blow away: *N.* in *OE.*, a fife or small flute. **WHIFF'LING**, *imp.* *-fling*: **ADJ.** moving inconstantly; shifting. **WHIFFLED**, *pp.* *hwif'fld*. **WHIFF'FLER**, *n.* *-fler*, one who frequently changes his opinions or course; a trifier, in *OE.*, a fife or piper in front of a company; a harbinger. **WHIFFLETREE**, the swing-tree or cross-bar to which harness-aces are fastened; a Swingle-tree (q.v.).

WHIG, *n.* *hwig* [*AS.* *hwæg*, whey; Scot. *whig*, a sour drink prepared from fermented whey—originally applied to the western Covenanters, from their sourness of aspect and demeanor: *W.* *chwig*, fermented, sour (but see **WHIGGAMORE**)]: a member of that one of the two great political parties of the United Kingdom now usually styled *liberals* or the *liberal party* (see below); an advocate of such changes in the constitution as tend in the direction of democracy; a moderate liberal. In the United States, in revolutionary times, *whig* was the opposite of *royalist* or *tory*, and denoted one who supported the revolution; in the 19th c. (about 1834–60), one of a nationalizing party who opposed the democrats or states-rights party (see **POLITICAL PARTIES** in the United States). **WHIG**, *a.* *pert.* to or composed of whigs. **WHIG'LING**, *n.* an old contemptuous name for a whig. **WHIG'GISH**, *a.* *-gish*, *pert.* to the whigs or their principles. **WHIG'GERY**, *n.* *-ger-ī*, or **WHIG'GISM**, *n.* *-gizm*, the principles of whigs, or their conduct. **WHIG'GISHLY**, *ad.* *-gish-li*.

WHIGGAMORE, *hwig'ga-mōr*: according to Bp. Burnet (in his *Hist. of his Own Times*), one of the company of persons who were accustomed to resort periodically from the s.w. counties of Scotland to the port of Leith to buy grain: so called from the word *whiggam* [perhaps a corruption of *whig on*, jog on—from *whig*, to jog], used by them in driving their horses. The name was extended to the much larger band, 6,000 strong, composed of persons in w. Scotland who were opposed to the court, and who on the defeat of the Duke of Hamilton, under the leadership of their ministers and headed by the Marquis of Argyle, marched to Edinburgh 1648, 'the ministers praying and preaching all the way with an unheard-of fury.' 'This,' says Bp. Burnet, 'was called the *Whiggamor's inroad*; and ever after that all who opposed the court came in contempt to be called *Whiggs*.' Hence, one of the party opposed to the court.

WHIG AND TORY: names which for the last two centuries have been popularly applied to two opposite political parties in Great Britain. Both were at first names of reproach. *Whig* was originally a nickname of the peasantry of the western lowlands of Scotland, said by some to be derived from a word or sound used by them in driving their horses (see **WHIGGAMORE**); by others, from *whig* (or *whey*), 'an acetous liquor subsiding from sour cream.'—*Jamieson*. Its next application was to the bands of Covenanters, chiefly from w. Scotland, who, subsequently to the

WHIG AND TORY.

murder of Abb. Sharpe, took up arms against the government, and, after gaining some successes in encounters with the king's troops, were defeated at Bothwell Bridge. Thence the name whig (or whiggamore) came to be fastened, first, on the Presbyterian zealots of Scotland; afterward on those English politicians who showed a disposition to oppose the court and treat Prot. nonconformists with leniency. The word *tory*—said to be derived from *tora*, *tora*, in Irish, 'give, give,' or 'stand and deliver'—was given first to bands of outlaws, half-robber, half-insurgent, professing the Rom. Cath. faith, who harassed the English in Ireland; and was thence applied reproachfully to all who were supposed to be abettors of the imaginary Popish Plot; and then generally to persons who refused to concur in the exclusion of a Rom. Cath. prince from the throne. These two nicknames, whig and tory, which came into use about 1680, immediately became familiar words, and have been retained as designations of two opposite political sides—the tories being, in general, the adherents of the ancient constitution without change, and the supporters of regal, ecclesiastical, and aristocratic authority; while the whigs have been the advocates of such changes in the constitution as tend in the direction of democracy. The most sweeping constitutional change of the 19th c. which the whigs have carried is the Reform Bill of 1832 (see REFORM, PARLIAMENTARY). Each party, while preserving within certain limits a general consistency of purpose, has undergone many changes in principles, professions, and modes of action; and among persons who have been considered adherents of each side at any given time, there have seldom been lacking a variety of distinctive shades of opinion. A division in the ranks of either party has often led the more moderate section of that party to coalesce with the opposite side; and at other times, the extreme party of innovation, dropping their connection with the whigs, have adopted another name, as when those politicians whose desire was to have the whole national system remodelled on a democratic basis assumed the designation *radical reformers* or *radicals*. See CHARTISM. For a considerable time after the Reform Bill, the governing section of the whig party were disposed more to maintain the principles of the changes already made, than to insist on further constitutional changes; and the principles maintained by whigs and tories sometimes approximated so closely that the difference seemed rather of men than of measures. Sometimes one party, sometimes the other, has appeared as the advocate of measures which have proved beneficial. In the agitation for the repeal of the Corn Laws, 1841–46, the tories were ranked on the side of protection, and the whigs on the side of free trade; but the relations of the two parties had been the reverse at a former period, when Pitt's advocacy of free trade between England and Ireland was opposed by the manufacturers of Lancashire, who succeeded in postponing his measure. Since about the middle of the 19th c. or earlier, the names *liberal* and *conservative* have almost entirely superseded the former

WHILE—WHIMBREL.

party designations of whig and tory: the beginning of this change of names was about 1830-32, when the more aristocratic and conservative whigs, who had long been dismayed at the atrocities of the French Revolution, more decisively separated themselves from the advanced reformers; while the latter in consequence conceiving a disgust at the name of whig, took the continental designation 'liberals.' In recent years a section of the former liberals, who have acted in great measure with the conservatives, have been known as liberal unionists.

WHILE, conj. *hwíl* [Goth. *hveila*, hour, time: Icel. *hvila*, a place of rest: Dan. *hvile*; Sw. *hvila*, rest: Ger. *weile*, time, leisure]: during the time that: as long as; at the same time that: in *OE.* and *Scot.*, until: N. space of time; continued duration; pains or time, as in 'worth *while*:' V. to cause to pass pleasantly, as time; to loiter. WHIL'ING, imp. WHILED, pp. *hwíld*. WHILES, conj. or ad. *hwíls*, in *OE.*, while; as long as; in *Scot.*, sometimes, as, *whiles* I'm homesick, *whiles* I'm no. WHILST, conj. *hwílst*, same as *while*. WHILERE, ad. *hwíl-är'* or *-är'*, in *OE.*, a little while ago; erewhile. TO WHILE AWAY THE TIME, to pass time idly but pleasantly.

WHILK, a. *hwílk* [Icel. *hvílikr*]: in *Scot.* and *OE.*, which.

WHILK, n. *hwílk*: same as WHELK, a Shell-fish.

WHILOM, ad. *hwí'lŭm* [AS. *hwilum*, at times]: in *OE.*, formerly; once; long ago.

WHILST: see WHILE.

WHIM, n. *hwŭm* [Icel. *hvima*, to wander with the eyes: Norw. *kvima*, to play the fool: Dan. *vimse*, to skip to and fro: Icel. *vim*, giddiness, folly]: a capricious fancy or conceit; a freakish humor: V. in *OE.*, to be full of, or indulge in, whims. WHIM'SEY, n. *-zŭ*, a whim; a freak. WHIM'SICAL, a. *-kal*, full of whims or odd fancies; capricious; freakish; odd. WHIM'SICALLY, ad. *-lŭ*. WHIM'SICALNESS, n. *-nŕs*, or WHIM'SICAL'ITY, n. *-kal'ŭ-tŭ*, the state or quality of being whimsical. WHIM'MY, a. *-mŭ*, whimsical; capricious.—SYN. of 'whim': caprice; humor; freak; fancy; changeableness; fickleness; variableness.

WHIM, n. *hwŭm* [Bav. *wimmen*, to stir: Dut. *wemelen*, to vibrate, to drive round]: a drum or capstan worked by horses or oxen for winding ore or coals out of a mine or in other similar ways.

WHIMBREL, n. *hwŭm'brŕl* [perhaps connected with *whimper*, from its cry]: a bird (*Numenius phaeopus*) of the same genus with the Curlew (q v.), and much resembling it in form, plumage, and habits, but smaller, and with bill considerably shorter in proportion. The female, which is larger than the male, is about 18 in. in length, the bill being about $3\frac{1}{2}$ in. The plumage of the W. is of bright ash-color, with streaks of brown on the neck and breast. The W. is a very widely distributed bird, being found from n. Africa and n. India to the arctic regions of Europe and Asia: it occurs also in Japan. It is a bird of passage, and visits Great Britain chiefly in its spring and autumn migra-

WHIMPER—WHINE.

tions. The eggs are deemed a delicacy, and the flesh also is prized for food.



Whimbrel (*Numenius phaeopus*).

WHIMPER, v. *hwīm'pēr* [Ger. *wimmern*, to cry in a subdued way: from same root as *whine*, which see]: to cry with a low, whining, broken voice, as a child; to express grief in a whining tone: N. a low, broken cry. **WHIM'PER-ING**, imp.: N. a low, muttering cry. **WHIM'PERED**, pp. *-pērd*. **WHIM'PERER**, n. *-pēr-ēr*, one who whimpers.

WHIM'SEY, **WHIM'SICAL**, etc.: see **WHIM** 1.

WHIN, n. *hwīn* [W. *chwyn*, weeds]: a wild prickly bush producing in early spring abundance of yellow flowers, the *Ulex Europæus*, ord. *Legumīnōsæ*; gorse; Furze (q.v.). **WHIN'NY**, a. *-nī*, abounding in whin-bushes. **WHIN-CHAT**, n. a bird (*Saxicola rubetra*) very similar to the Stone-chat (q.v.), a summer visitant of Great Britain and of n. Europe. It is widely diffused over the Brit. Islands in summer, but nowhere very abundant. The head, sides of the neck, and upper parts of the body are blackish brown, each feather bordered with rusty yellow; an elongated streak of white above each eye; throat and a streak on each side of the neck white; breast rust-color; large white spot on each wing; tail white, except the two middle quills and the tip, which are blackish brown. The colors of the female are less distinct than those of the male. The W. frequents furze (or whin) bushes (hence the name), and nests on the ground. Its song is pleasant.

WHIN, or **WHINSTONE**, n. *hwīn* [Scot. *quhyn*, greenstone: Icel. *hwīn*, resounding]: *literally*, the resounding-stone; in *Scotland*, any hard and compact stone, as distinguished from sandstone or freestone, and from rocks of slaty structure. Thus, in most parts of Scotland, it is the common appellation of basalt, greenstone, and other trap-rocks, and in some districts of granite.

WHINE, v. *hwīn* [Goth. *quainon*; Ger. *weinen*; Icel. *kreina*, to weep, to lament: Dan. *hvīne*; Sw. *hvīna*, to whistle: W. *chwyno*, to bewail]: to utter in plaintive drawling tones or cries; to complain in a mean or unmanly way;

WHINGE—WHIP.

to make a plaintive cry, as some animals: N. a drawling plaintive tone of voice; mean or affected complaint. WHIN'ING, imp. WHINED, pp. *hwīnd*. WHIN'INGLY, ad. -li. WHINER, n. -ér, one who whines.

WHINGE, v. *hwīnj* [see WHINE]: in *Scot.*, to whine; to sob. WHINGING, imp. *hwīnj'ing*. WHINGED, pp. *hwīnjd*.

WHINGER, n. *hwīng'ér*: in *Scot.*, a weapon for secret deeds; a short hanger or sword used at meals and in brawls: also spelled WHINYARD. *Note.*—An older spelling is *whiniard*, formed after the same model as *poniard*. The spelling *whinyard* arose from the desire to account for the origin of the word—that is, the weapon whose blade is supposed to be a *yard* in length: *hanger* is another spelling, in allusion to its handy character as a weapon that can be conveniently suspended.

WHINNY, v. *hwīn'nī* [imitative of the sound—allied to Eng. *whine*: comp. L. *hinnīrē*, to neigh]: to neigh or cry like a mare: N. the cry of a mare. WHIN'NYING, imp.: N. the cry of a mare. WHIN'NIED, pp. -nīd.

WHINNY: see WHIN 1.

WHINSTONE: see WHIN 2.

WHIN'YARD: see WHINGER.

WHIP, n. *hwīp* [O. Dut. *wippe*, a whip: Dan. *vippe*, to rock, to wag: Icel. *hvipp*, a quick movement; *svipa*, to whip: comp. Gael. *cuip*, a whip: W. *chwip*, a quick turn]: a lash of plaited cords or the like tied to a handle, especially used in driving horses, etc.; hence, one who drives; a driver, as, 'a wretched *whip*,' a bad coachman: also a name applied to a member of a political party in the Brit. parliament, specially charged with the duty of bringing the members of his party together on all important questions before the house; the summons issued to members of a party by its leaders to be in their places at a particular time in order to support some particular measure with their votes: a small lift-purchase made by a rope rove through a single block and then through a snatch-block, and worked by a horse or horses which walk away from the thing hoisted—sometimes called *whip-and-derry*; a tied-up flag used for signalling: V. to strike or beat with a quick motion; to strike with a lash or anything flexible; to correct with lashes; to drive with lashes; to beat into froth, as cream: in *sewing*, to overedge or overcast; to wind closely round and round with cord, thread, or the like, as to *whip* a spliced shaft with strong cord; to enwrap; to seize (in its nautical sense): to lash with sarcasm; to take anything nimbly, out, up, or away; to move nimbly; to start suddenly. WHIP'PING, imp.: N. the act of punishing with a lash; the state of being corrected with a whip: in *sewing*, overcasting. WHIPPED, pp., or WHIPT, pp. *hwīpt*. WHIPPER-IN, *hwīp'pér-in*, among *huntsmen*, one who keeps the hounds from wandering; a parliamentary whip. WHIP'PER, n. -pér, one who whips; a porter who raises coal from a ship's hold by means of a tackle. WHIP-CORD, cord of which the ends of lashes are made. WHIP'-HAND, the hand that holds the

WHIPPING.

whip in riding or driving; the right hand; an advantage or advantageous position. WHIP'LASH, the lash or striking part of a whip. WHIP'SAW, a large saw set in a frame for dividing large timber lengthwise. WHIP'STAFF, in a *ship*, a bar by which the rudder is turned. WHIP'STER, n. -*stër*, a nimble fellow; a whipper-snapper. WHIP STOCK, n. -*stök*, the handle of a whip. WHIP'PING-POST, a post to which offenders are tied when punished by whipping. To WHIP ABOUT or ROUND, to wrap. To WHIP OUT, to draw out nimbly; to snatch. To WHIP FROM, to take away suddenly. To WHIP UP, to seize or take up with quick motion. WITH WHIP AND SPUR, with the utmost haste. To HAVE THE WHIP'-HAND OF, to possess the advantage over. WHIP'PER-SNAP'PER, an insignificant and diminutive person.

WHIP'PING: infliction of stripes as a punishment; formerly often awarded by the criminal law of England for minor offenses, such as petty larceny, and frequently super-added to some other punishment, such as imprisonment or the pillory. In early times, and by the usage of the Star Chamber, whipping was not to be inflicted on a gentleman.—In Scotland, also, sentence of whipping was frequent, the terms of the sentence sometimes requiring it to be repeated at intervals and in different parts of the kingdom. In the 18th c. the Scottish burgh magistrates were in the habit of awarding sentence of whipping on summary convictions for police offenses, such as broils, street outrages, and keeping of disorderly houses; but in modern practice the competency of inflicting this sentence at common law without intervention of a jury has been brought into question. Whipping was not long ago an occasional addition to the sentence of the justiciary court on persons convicted of aggravated assaults.

The infliction of corporal punishment by whipping on women was prohibited by Act 1 Geo. IV. c. 57. Recent legislation in England and Scotland has made various provisions for infliction of whipping on juvenile culprits; and Act 26 and 27 Vict. c. 44 provides for this punishment in England of adults also, convicted of a certain class of crimes. It is a general impression among Eng. magistrates that whipping to the moderate extent allowed by 26 and 27 Vict. has had a most salutary effect in repressing certain kinds of outrage; the fear of mere imprisonment, or even of penal servitude, having little efficacy in the way of prevention.

In the United States, as far as the general govt. is concerned, W. was abolished (with the pillory) by act of congress 1839, Feb. 28. It is still practiced in a few of the states—notably Del.—but in most of the states it has yielded to the penitentiary system.

As regards corporal punishment in the army and navy see FLOGGING.

WHIPPLE.

WHIPPLE, *hwîp'pl*, **ABRAHAM**: naval officer in the American Revolution: 1733–1819, May 29; b. Providence, R. I. He was first a capt. in the W. India trade, afterward commanding a noted privateer in the French war. In 1772 he led a secret expedition that burned an obnoxious revenue-vessel in Narragansett Bay. In 1775, June, he was appointed, by the authorities of Rhode Island, commodore, in command of two armed vessels, and captured near Newport the tender of the Brit. frigate *Rose*. In four years following 1775, with the schooner *Providence*, he seized and destroyed an unexampled number of the enemy's vessels. His own vessel was captured, and then, in the frigate *Providence*, he ran a blockade of Narragansett Bay 1779, carried dispatches to France, and, on his homeward voyage, fell in with 150 vessels from Jamaica, convoyed by a Brit. man-of-war. He hoisted the Brit. flag, passing his ship off as a merchantman, and, on successive nights, quietly seized and manned 10 vessels, with valuable lading, getting them out of sight before morning. Eight of these prizes reached patriot ports. In 1780, while defending Charleston, he was taken prisoner, and held until the end of the war. He was capt., 1784, of the first ship that bore the U. S. colors in a voyage to London. Retiring to a farm at Cranston, R. I., he was afterward one of the pioneer farmers in Ohio, settling at Marietta, where he died.

WHIP'PLE, **AMIEL WEEKS**: soldier: 1818–1863, May 7; b. Greenwich, Mass. After studying at Amherst and graduation at West Point, he was on hydrographical surveys 1841–2, asst. astronomer on boundary surveys 1844–49, at the head of the Pacific railway survey on the 35th parallel 1853, and engineer in the light-house and other depts. 1856. In the beginning of the civil war he was chief topographical officer on the staffs successively of Gens. McDowell and McClellan, and was promoted lieut.col.; 1862 commanded the defenses of Washington on the right bank of the Potomac, having been promoted brig.gen.; led his division, as one of the third corps, in the second battle of Fredericksburg, 1862, Dec. 13 (having previously won his colonelcy in the first battle there); and was fatally wounded at the battle of Chancellorsville, 1863, May 4, dying in Washington three days later, but not before he had been brevetted maj.gen. for gallant conduct.—His son Capt. **CHARLES WILLIAM W.** has been chief ordnance officer in the dept. of the Missouri.

WHIP'PLE. **EDWIN PERCY**: reviewer and lecturer: 1819, Mar. 8—1886, June 16; b. Gloucester, Mass. After education in the Salem high school, where he distinguished himself as scholar and writer, he was employed successively in a bank, a broker's office, and long as news-room supt. in the Boston Merchants' Exchange; subsequently as literary editor of the *Evening Transcript* and *Boston Globe*. From 1843 onward he became widely known as a lecturer, and as a reviewer of extraordinary insight and brilliancy, notable especially for nerve, pith, and power of diction. He published *Essays and Reviews*, 2 vols. (1848–9); *Literature and Life* (1849); *Character and Characteristic Men*

WHIPPLE.

(1866); *Success and Its Conditions* (1871); *Literature of the Age of Elizabeth* (1876); and a volume, *Recollections of Eminent Men, and other Papers*, was published the year after the author's death. Mr. Whipple died in Boston. He was beloved for his geniality in social intercourse, a quality marked in his writings.

WHIP'PLE, HENRY BENJAMIN, D.D.: bishop of the Prot. Episc. Church: b. Adams, N. Y., 1822, Feb. 15. Ill health obliged him to turn from college to business as a merchant in his native place; but he was soon attracted to the ministry, and, after theological study, was ordained at Geneva, N. Y., by Bp. De Lancey. He officiated as priest at Sackett's Harbor, N. Y.; seven years as rector at Rome, N. Y.; and two years in the Church of the Holy Communion in Chicago. In 1859 he was consecrated first bp. of Minn. The next year he was an active promoter of the Seabury mission, the girls' school, and a school for boys, at Faribault, Minn. The mission became a divinity school, of which one of the buildings bears his name. His wise and self-denying efforts for education and improvement of the Indians led to his appointment by the U. S. govt. on a commission for their benefit. He was one of the administrators of the Peabody education fund. He wrote much in regard to philanthropic enterprises. He died 1901, Sept. 16.

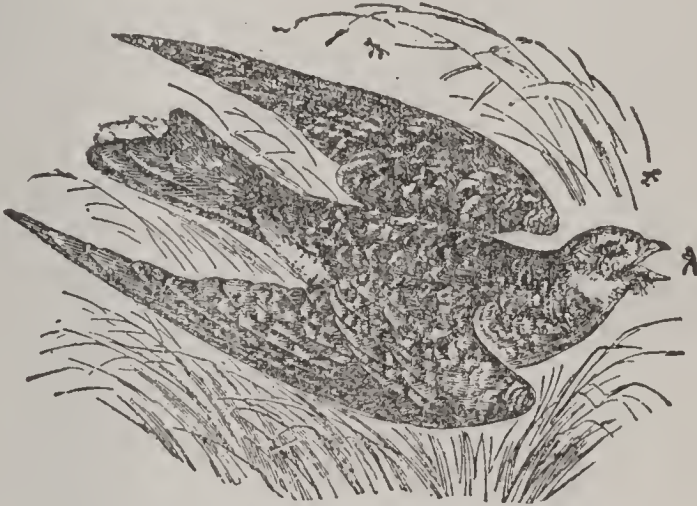
WHIP'PLE, WILLIAM: one of the signers of the Declaration of Independence: 1730, Jan. 14—1785, Nov. 28; b. Kittery, Me. He was in command of a vessel in foreign trade before he was of age; and, when nearly 30 years old, left the sea for mercantile business in Portsmouth, N. H. He was elected to congress 1775, 76, and 78, and to the state assembly 1780-84. Made brig.gen. 1777, he led a brigade in the battles of Saratoga and Stillwater; and, the next year, had part in Gen. Sullivan's siege of Newport. For two years from 1782 he was supt. of N. H. state finances, and judge of the state supreme court; and, from 1784 until his death in Portsmouth, 'justice of peace and the quorum' for the state. It is noteworthy that he emancipated his own slaves, though he had been a slave-trader.

WHIP'PLE, WILLIAM DENISON: soldier: b. Nelson, N. Y., 1826, Aug. 2. After graduation at West Point 1851, and service in New Mexico, he was at Indianola, Tex., whence, on the seizure of the post by secessionists, he escaped north; was appointed capt., and asst. adjt.gen.; participated in the battle of Bull Run; and 1862 was promoted lieut.col., and was Gen. Cadwallader's chief of staff. The next year, commissioned brig.gen. of vols., he was chief of staff to Gen. George H. Thomas, and acted in the memorable battles and operations conducted by that general. For his distinguished services he was brevetted maj.-gen. in the regular army 1865. After the war he was asst. adjt.gen. in a number of divisions, and aide-de-camp to the head of the army, Gen. Sherman, 1873-81. In 1887 he was promoted col. in the adjt.gen.'s dept.; and 1890, Aug. 2, was placed on the retired list. He died 1902, April 2.

WHIPPLETREE—WHIR.

WHIPPLETREE, n. *hwǐp'pl-trē* [*whipple*, a frequentative of *whip* and *tree*]: a swing-bar to which the traces are fastened in a carriage; whiffletree, swingtree, or swingletree (q.v.).

WHIP-POOR-WILL, *hwǐp'pūr-wīl* (*Caprimulgus* or *Antrostomus vociferus*): species of Goatsucker (q.v.), native of N. America, common in the e. United States. Another name is Night-jar, applied also to other Goatsuckers. It receives its popular name from the fancied resemblance of its notes to the words *Whip poor Will*. It is about 10



Whip-poor-will (*Caprimulgus vociferus*).

in. long, the grayish plumage much mottled and indistinctly marked with small transverse bands of black and buff, the top of the head streaked with black, and a narrow collar, which, as well as the outer tail-feathers, is white in the male, tawny in the female. The bristles at the base of the bill are very stiff, and more than an inch long. This bird is seen seldom during the day, but seeks its food by night, catching moths, beetles, and other insects on the wing. Its flight is near the ground, zigzag, and noiseless. Its notes are heard only during the night, and are clear and loud; so that when a few of these birds are close at hand, the noise is such that those unaccustomed to it cannot sleep. In the more s. parts of the United States, but n. to Ill., the W. is replaced by a larger species, the Chuck-Will's-widow (q.v.); and on the upper Missouri and to the w. by a smaller one (*C.* or *A. Nuttalli*).

WHIR, v. *hwēr* [imitative of a humming noise: Sw. *hurra*, to whirl: Dan. *hvirre*, to buzz, to hum. W. *chwyrnu*, to hum]: to whirl or move round rapidly with a humming noise, as a wheel; to make a noise as partridges or pheasants when they rise from the ground; in *OE.*, to hurry away: N. a rough whirring sound. **WHIR'RING**, imp.: N. the noise of partridges' or pheasants' wings. **WHIRRED**, pp. *hwērd*.

WHIRL—WHIRLWINDS AND WATERSPOUTS.

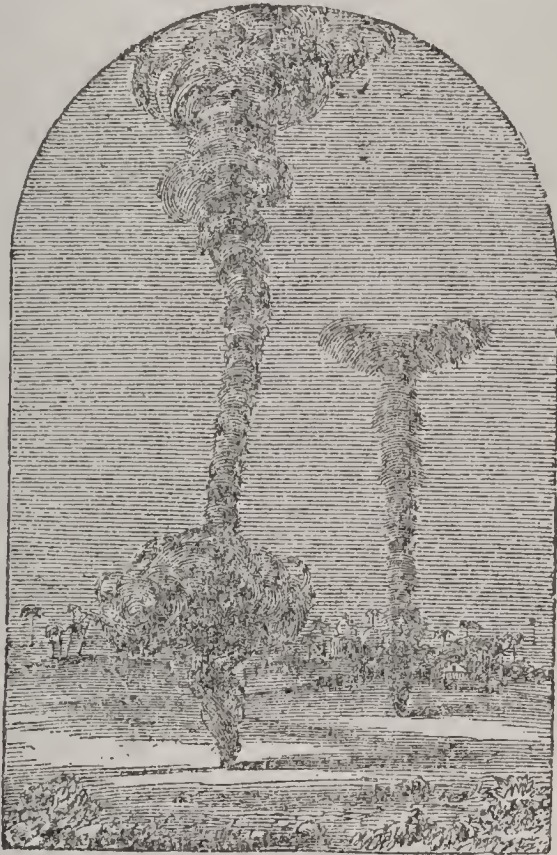
WHIRL, *whörl* [Dan. *hvirele*; Ger. *wirbeln*; Icel. *hvírfu*, to whirl: Icel. *hverfa*, to turn round (see also WHARF)]: to move or to cause to move round rapidly; to turn round or rotate with velocity: N. rapid rotation; anything that moves or is turned with velocity on an axis or centre; gyration; rapid circumvolution; anything moved with rapid rotation. WHIRL, or WHORL, n. in *conch.*, a single turn of the spire of a univalve shell, such as that of the garden snail. WHIRLING, imp. *-ing*. WHIRLED, pp. *hwérlt*. WHIRLER, n. *-ér*, one who or that which whirls. WHIRLABOUT, n. *hwérl'a-bowt*, a whirligig or merry-go-round; a carousel. WHIRL-BLAST, a whirling blast of wind. WHIRL'BONE, the round cap of the knee; the kneepan. WHIRL'NOTE, *-i-kót*, a cot or led on wheels; one of the oldest kinds of carriages known in England—used in the 14th c. for conveyance of invalids, and afterward becoming popular for conveyance of ladies. WHIRL'IGIG, n. *-i-g'ig*, a toy which children spin or whirl round; a miniature wind-mill vane pivoted with a pin on the end of a stick, which children cause to whirl or revolve rapidly by moving it through the air. WHIRL'POOL, n. *-pöl*, a body of water moving with a circular motion, forming a cavity or vortex in the centre, into which all bodies coming within its influence are drawn and ingulfed; any rotatory or circular motion of water caused by opposing winds and tides.

Whirlpools on a large scale are rare; but illustrations in miniature are seen in the eddies formed in a river by obstacles or deflections. The two celebrated sea-whirlpools Charybdis (see SCYLLA) and Malström (q.v.) are now known to be merely 'chopping seas,' caused by the wind acting obliquely on a rapid current setting steadily in one direction while the tide is flowing, and in the opposite direction when it is ebbing. During calm weather, neither of these so-called whirlpools is dangerous for large ships; but when the current and the wind are strongly in opposition, the broken swell is so violent and extensive in the Malström as to founder large ships, or drive them against the rocks. Though in neither of these two cases, formerly so much dreaded, is there any vortical action, instances of such action do actually occur in various localities, as in the whirlpool of Corrievrekin (q.v.), and in some eddies produced by opposing winds and currents among the Orkney Islands. WHIRL'WIND, n. *-wínd*, aerial currents that assume a rotatory, whirling, or spiral motion, often of great and destructive violence, but of short duration.

WHIRL'WINDS AND WATERSPOUTS: aerial and aqueous currents that assume a whirling or spiral motion. — *Whirlwinds* differ in many respects from the storms described under the titles CYCLONE, STORMS, and TYPHOON. They differ also from tornadoes, which accompany Cyclones (q.v.), though these have a whirling motion. On a very small scale, whirlwinds are of frequent occurrence, shown by the movements of dust in a road. The direction of the eddy of the whirlwinds differs from the rotation of winds in a storm, or in a tornado, in that it may take place either way—right to left, or left to right—ac-

WHIRLWINDS AND WATERSPOUTS.

According to the direction of the stronger of the two winds which give rise to the whirlwind. Thus, suppose it to arise from a n. wind blowing side by side with a s. wind, and to the w. of it; then, if the n. wind be stronger, the whirl will be n., w., s., and e.; but it will be in a contrary direction if the s. wind be stronger. Whirlwinds often originate within the tropics during the hot season, especially in flat sandy deserts; these, becoming unequally heated by the sun, give rise to ascending columns of heated air. In their contact with each other, the ascending currents result in eddies, which draw up with them large clouds of dust, and the whole is borne forward by the wind that



Dust Whirlwinds.

(From Baddeley's *Whirlwinds and Dust-storms of India*.)

may happen to be blowing at the time. This is the origin of the *dust whirlwinds* of India. These dust-storms are frequent in dry warm regions: and in the case of the *Simoom* (q.v.), which may be regarded as a succession of such whirlwinds, they appear on a scale of appalling grandeur. Extensive fires, such as the burning of prairie grass or of buildings, and volcanic eruptions, also cause whirlwinds, by the conflicting currents of heated air which they occasion.

Waterspouts are whirlwinds occurring on the sea or on lakes, though they may be also true tornadoes. When fully formed, they appear as tall pillars of cloud stretching from the sea to the sky, whirling round their axes, and exhibiting the progressive movement of the whole mass precisely as in the case of the dust whirlwind. The sea at the base of the whirling vortices is thrown into violent

WHISK—WHISKY.

commotion, resembling the surface of water in rapid ebullition. It is a popular fallacy that the water of the sea is sucked up in a solid mass by waterspouts; but it is only the spray from the broken waves which is carried up. Observations of the rain-gauge conclusively prove this. What are sometimes called *waterspouts on land* or *cloud-bursts* are quite distinct from these phenomena. They are merely extraordinarily heavy falls of rain of a very local character.

WHISK, n. *hwisk* [representing the sound of a light or fine body moving rapidly through the air: Ger. *wisch*, a mop, a wisp of straw; *wischen*, to wipe, to sweep: Sw. *wiska*, to wipe, to dust: Dan. *viske*, to wipe or sponge; *visk*, a wisp, a rubber]: a small bunch of grass, straw, or hair, and the like, used as a brush or broom; a quick sweeping motion; an instrument for agitating or whisking such articles as cream, eggs, etc.: V. to sweep, brush, or agitate with a light rapid motion; to move nimbly and rapidly. WHISK'-ING, imp. WHISKED, pp. *hwiskt*. WHISKER, n. *hwis'kér*, one who or that which whisks; one of the long bristly hairs on the upper lip of a cat and some other animals; hence formerly the hair on a man's upper lip; a mustache; now the hair on the cheeks of a man, as distinguished from that on the upper lip, which is called *mustache*, and that on the chin, which is called *beard*, though *beard* is sometimes used for all the hair on a man's face except the mustache; commonly in the plural *whiskers*. WHISK'ERED, a. *-kér'd*, formed into or furnished with whiskers. WHISK'ERLESS, a. *-lès*, without whiskers. WHISK'ERY, a. *-kér-ì*, having whiskers, or with a tendency to have them. WHISP, *hwisp*, or WISP, n. *wisp*, a handful of straw, or the like, used for whisking or wiping.

WHISK'ER: see WHISK.

WHISKY, or WHISKEY, n. *hwis'kì* [Gael. *uisge-beatha* (commonly written *usquebaugh*), whisky—from *uisge*, water, and *beatha*, life; equivalent to L. *aqua vite*, water of life]: an intoxicating spirit distilled from grain, roots, and other materials—the best being produced from barley after it has been malted, though what is termed raw grain whisky (made from wheat, oats, rice, rye, Indian corn, buckwheat, millet, etc.), after being kept for two or three years, is scarcely inferior in quality. W. is made also from beet-root, potatoes, beans, molasses, sugar, etc. In these cases, malt is used to a small extent. For the mode of manufacture, see DISTILLATION. W. was formerly manufactured almost exclusively in Scotland, Ireland, and the United States; but distilleries are now at work in England, Prussia, Sweden, France, Holland, and Belgium, though the spirit produced in those countries is coarser, and suited only for fortifying wines and for methylated spirit for manufacturing purposes. In 1885 there were 127 distilleries in Scotland, 27 in Ireland, 10 in England; total product in the three kingdoms for the year ending 1886, Mar. 31, 38,961,842 gallons. Of this, England consumed 15,290,816 gals., Scotland 6,297,365, Ireland 4,754,670 gals.; and 2,808,198 gals. were exported. Export is en-

WHISKY.

couraged in Great Britain by a drawback in excess of duty of 2*d.*, while 4*d.* a gallon is added to duty on foreign spirit imported, 4*s.* on sweetened, and 6*s.* 6*d.* on perfumed spirits. The manufacture of W. (as well as of other spirits) in the United Kingdom is placed under the surveillance of the excise, and by act of parliament (6 Geo. IV. c. 80) the distiller is subjected to numerous stringent regulations to prevent evasion of the very high duties. The total excise revenue from the manufacture, sale, and consumption of British spirits 1885 was £13,140,695 (about \$65,703,000). Parliament attempted, about the beginning of the 18th c., to check the excessive use of ardent spirits by imposing the enormous duty of 20*s.* a gallon, and taxing retailers. The trade became unprofitable, and got entirely into the hands of the profligate and criminal classes. Smuggling flourished, the excise-officers were violently opposed, and informers hunted down. The act became a dead letter, and was repealed 1742, and a moderate duty imposed. In Ireland and Scotland the repressive system of high duties caused still greater difficulties, and was modified at successive periods: in 1860 the duty was fixed at 10*s.* per imperial gallon.

In the United States the process of manufacture is the same as in the United Kingdom, and is largely carried on in N. Y., Penn., Ohio, Ill., Ind., Ky., and in a less degree in Tenn., Mo., Cal., and some other states. A large quantity also is rectified, and reduced to alcohol; and much is exported, and in part returned in the form of 'French brandy,' 'Hollands,' etc. The 'Monongahela' W. of Penn., and the W. from Bourbon co., Ky., are considered the best in the United States.

The following shows the condition of the W. industry for the year ending 1902, June 30:

	Bourbon.	Rye.
Remaining in warehouse 1901, July 1.	78,969,523 gals.	54,844,272 gals.
Production during year,	20,336,250 "	21,587,221 "
Total,	99,305,773 "	76,431,493 "
Withdrawn on payment of tax,	12,300,149 "	8,878,798 "
Tax paid and bottled in bond,	279,510 "	244,013 "
Loss by leakage or evaporation in warehouse,	2,833,835 "	2,074,906 "
Withdrawn for scientific purposes,	623 "	2,095 "
Withdrawn for export,	534,113 "	25,522 "
Withdrawn for transfer to manuf. warehouse,	1,198 "	16,420 "
Withdrawal for transfers to bonded warehouses,	711,446 "	129,816 "
Remaining in warehouse 1902, June 30,	82,642,180 "	65,033,738 "
Total,	99,305,773 "	76,431,493 "

During that year 1,372 grain distilleries were registered in the U. S., of which 1,089 were in operation. They used 27,487,351 bushels of grain, and produced 123,847,304 gals. of spirits of different kinds. In the same period 1,048 illicit stills were destroyed by int.-revenue

WHISKY INSURRECTION—WHIST.

officers and 146 removed; 1,036 persons were arrested, one officer was killed while on duty, and two were wounded. In the year ending 1903, June 30, the export of Bourbon W. was 169,396 proof vals., value \$203,480; and the import of all distilled spirits (excluding brandy) was 3,229,526 proof gals., value \$4,834,580.

WHISKY INSURRECTION: a revolt or outbreak in Penn., 1794, against the execution of a federal law which had been passed by congress 1791, imposing a duty on all whisky distilled in the United States. Excise duties have always been unpopular, but this law was specially obnoxious to the inhabitants of the w. counties of Penn., Va., and N. C.; because, first, their distance from the seaboard, precluded their securing profit from their grain except by converting it into the more portable form of whisky; and because, secondly, offenders under the law could not be tried in their own counties, but had to answer in Philadelphia. Dissatisfaction with the law was manifested from the beginning, but did not take the form of active organized opposition to the government until 1794, July, when the federal marshal endeavored to serve 50 writs in the w. counties of Penn. Aug. 7 a proclamation from the pres. ordered the insurgents to disperse, and a requisition for 15,000 militia was issued. The troops arrived in the disturbed district in Nov., and the insurrection collapsed at once, the more active leaders having either fled the country or joined the government forces. Only two lives were lost.

WHISP: see **WHISK**.

WHISPER, v. *hwis'pér* [O.Dut. *wisperen*, *wispelen*; Ger. *wispeln*; Icel. *hwiskra*; Dan. *hviske*; Sw. *hwiska*, to whisper]: to speak softly or under the breath; to utter in a low and not vocal tone; to prompt or plot secretly: N. a low soft tone of voice audible only to the person or persons spoken to; words uttered in a soft low voice. **WHIS'PERING**, imp.: N. the act of speaking in a low and scarcely audible tone; the telling of tales to excite suspicions. **WHIS'PERED**, pp. *-pèrd*. **WHIS'PERER**, n. *-pér-ér*, one who whispers; one who tells secrets; a backbiter; one who slanders secretly. **WHIS'PERINGLY**, ad. *-lî*. **WHISPERING GALLERY**, a gallery or dome in which the faintest sounds are conveyed to a great distance and with great distinctness.

WHIST, int. *hwist* [the int. commanding silence was written *st!* by the Romans: Ger. *st!* hist! Scot. *whisht*, hush, be silent]: listen; be still: ADJ. in *OE.*, not making a noise; mute; still: V. in *OE.*, to silence; to keep silence; to become mute or still.

WHIST: game at cards, believed to be of English origin; probably a development of the game of *trump* (properly *triumph*), which was played in England as early as the time of Henry VIII. Trump (or triumph) is mentioned in a sermon delivered by Latimer on the Sunday before Christmas 1529. The game of trump is mentioned also by Shakespeare, punning on the word triumph (see Douce's *Illustrations*, and *Antony and Cleopatra*, act iv. sc. 12). The game of whist is not mentioned by Shakespeare, nor by any writer of the Elizabethan era.

The earliest mention of *whist* (or, properly, *whisk*) is in the poems of Taylor the Water-poet (1621). In the first ed. of Cotton's *Compleat Gamester* (1674), whist has no place; but it is added in the 2d ed. (1680) as a game 'commonly known in England.' Cotton says that 'the game of whist is so called from the silence that is to be observed in the play;' and this derivation of the word has been generally accepted, and was adopted by Dr. Johnson to the extent of explaining whist to be a game requiring silence. But if the original name of the game was whisk, Cotton's derivation fails. The derivation from an interjection signifying silence seems to have been taken for granted somewhat hastily.

The game was formerly played nine-up: the change to ten-up seems to have taken place in the first quarter of the 18th c. Whist played ten-up is called *long whist*. About 1785 the experiment of dividing the game into half was tried, and *short whist* was the result. The short game soon came into favor; and 1864 in England the supremacy of short whist was acknowledged—nearly all the London and many country clubs adopting as their standard the laws of short whist as framed by committees of the Arlington and Portland clubs.

Edmond Hoyle (1672–1769), the first writer of any celebrity on whist (commonly called the father of the game), was born—it is said, but on insufficient authority—in the neighborhood of Halifax, Yorkshire; and was educated as a barrister: he died in London. He published his *Short Treatise* about 1742. He used to give lessons in whist at a guinea a lesson. His *Short Treatise* ran through many editions (16 or more) during his lifetime; and since his death his works have been reproduced in numberless ways.

The game of whist is played with a full pack of 52 cards, by four persons, two being partners against the other two. The partners sit opposite to each other. The partnership is determined by cutting. The two lowest are partners against the two highest, and the lowest has the deal and the choice of seats and cards. In cutting, the ace is reckoned lowest. Each player has a right to shuffle the pack once before each deal, the dealer having the privilege of a final shuffle. The shuffling being concluded, the player to the dealer's right cuts the pack. The dealer, having reunited the packets, deals the cards one at a time to the players in rotation, beginning with the player to his left. He turns up the bottom card (called the trump card). The deal being completed, the players sort their cards, and the

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player to the dealer's left (or leader) plays a card face upward on the table. The other players follow in rotation, being bound to follow suit if they can. When all have played, the 'trick' is complete: it is then gathered and turned over by the winning side. The highest card wins the trick. The ace is highest in playing; and the other cards reckon in the order, king, queen, knave, ten, etc., down to the deuce, or two, which is lowest. If any player cannot follow suit (i.e., has none of the suit led), he may play any card that he chooses. If he plays a card of the suit turned up (called trumps), he wins the trick unless another player also, having none of the suit led, plays a higher trump. The player who wins the trick becomes the leader for the next trick, and so on till the whole hand (consisting of 13 tricks) is played out.

After scoring, the player to the last dealer's left deals in his turn; and in subsequent deals each player deals in turn, the rotation going to the left.

After the hand is played out, the scoring is thus performed: the side who win more than six tricks reckon one for each trick above six; moreover, if honors are counted, the side who either separately or conjointly hold more than two of the following cards, ace, king, queen, and knave of trumps (called honors), reckon as follows: if they hold any three honors, they score two (that being the excess of their honors over their opponents'); similarly, if they hold four honors, they score four. When each side holds two, honors are said to be 'easy,' and neither scores on account of honors. At short whist, players who are at four cannot score honors: the same at long whist with players who are at nine. The side who thus in one hand or in a succession of hands first reach five at short whist, or ten at long, score the game.

A game at short whist is called a single if the adversaries have already scored three or four; a double if they have scored one or two; a treble if they have scored nothing. A game at long whist is a single if the opponents have scored five or more; a double if they have scored less. There is no treble at long whist.

A rubber consists of the best two games out of three: if the same players win two consecutive games, the third is not played. The winners of the rubber win in points the value of the games that they have won, and where the rubber has consisted of three games, the value of the loser's game is deducted. And whether two or three games are played, two points are added for the rubber at short whist; one point for the rubber at long. Thus, if at short whist A B (partners) win a single and a double, they win three points on the games, and they add two for the rubber, making five points. Had A B won the same, but C D (their opponents) won a treble, they would have to deduct three points, the value of the opponents' game, and would win only two points. Long whist is now seldom played.

Whist, especially when honors are counted, is a mixed game of chance and skill. The chance resides in the holding honors and the fortune of having high cards dealt in

the hand. In the United States, however, honors are seldom counted. The skill consists in application of such knowledge as shall, in the long run, turn the chances of the cards in the players' favor. At the beginning of the hand, the first lead presents a problem of almost pure chance; but as the hand proceeds, observation of the fall of the cards, inference therefrom, memory, and judgment come in, so that toward the end of the hand there is often presented a problem of almost pure skill. It is these ever-varying gradations of skill and chance that give the game its chief interest as a scientific pastime.

To become a skilful player, it is necessary to bear in mind that the game is not a game of any given player's hand against the other three, but a combination of two against two. In order that two partners shall play their hands to the best advantage, they must strive as much as possible to play the two hands as though they were one. To this end, it is advisable that they should pursue some uniform system of play, in order that each partner shall understand the plans of the other, and so be placed in the most favorable position to assist him in carrying them out.

From the earliest days of whist it has been generally agreed that the first, called the *original* lead, should be from the player's strongest suit. A strong suit is one that contains either a large number of cards (four or more) or several high cards. The suit containing the largest number of cards (numerical strength) is the one to be preferred. The object in opening with the strongest suit is to exhaust the cards of that suit from the other hands. When this object is accomplished, the cards of the suit which remain in the leader's hand (called long cards) obtain a value which does not intrinsically belong to them. They often become of great service, for, when led, they either compel the adversary to trump, or else they make tricks. And when trumps all are out, the player who has the lead makes as many tricks as he has long cards.

On the other side, by opening weak suits there is great risk of sacrificing partner's strength and of leaving long cards with the opponents.

Some players are accustomed to lead single cards; but experience shows that weak leads, as a rule, do more harm than good. Sometimes a trick or two is made by playing a trumping game; but the chances are that such tactics sacrifice partner's hand and clear the suit for the adversaries.

The proper card of the strong suit to lead has been a matter of controversy. For long the rule was—and very generally still is—to lead the lowest. The intention is for the third player to play his highest, and so to assist in clearing his partner's strong suit. Moreover, if the leader keeps the best cards of his suit in his own hand, he has a fair chance of getting the lead again when his suit is nearly or quite established. But with ace and four or more small ones, it has been considered best to begin with the ace, lest the ace be trumped second round; also, with a strong sequence in the strong suit, it is best to lead one of the se-

quence first, lest the adversaries win with a very small card. The following are the principal leads from sequences:

From ace, king, queen—lead king, then queen.

From ace, king, and small—lead king, then ace.

From ace, queen, knave—lead ace, then queen.

From king, queen, knave, and more than one small—lead knave.

From king, queen, knave, and one small—lead king.

From king, queen, and small—lead king.

From king, knave, ten, nine, etc.—lead nine.

From king, knave, ten, and small—lead ten.

From queen, knave, ten, and small—lead queen.

From knave, ten, nine, and small—lead knave.

After the first trick the lead may remain with the first leader. His best play, as a rule, is to continue his suit. If the lead falls to another player, his play, as a rule, will be to open his best suit; and so on. If the lead falls to the first player's partner, he (the partner) has choice of two modes of play: either first to open a strong suit of his own—e.g., one of those in the list above, and containing four or more cards—or, as is preferable, to continue the suit his partner first led, by returning his partner's suit. The object is to strengthen partner by assisting to clear his strong suit.

In returning a suit, if the player has only two cards of it remaining in his hand, he should return the highest; if more than two, the lowest. The exception is, if he has the winning card, he should return that irrespective of the number of other cards in the suit. The reason of this rule is that, with but two cards of the suit remaining, the player is weak in the suit, and he is therefore bound to sacrifice his good card to support his partner. But with three or more remaining after the first round, he is strong, and is therefore justified in calling on partner to support him.

This rule of play is most important. It should be carefully observed with even the smallest cards, as it enables partner to count the situation of the remaining cards. For example: A leads a suit in which C (his partner) holds ace, three, and two. In returning A's suit, after winning with the ace, C is bound to return the three, and not the two. When C's two falls in the third round, A will know that his partner has no more of the suit. But suppose C's cards to be ace, four, three, and two. In returning the suit, C is bound to choose the two. Then after the third round, A will conclude with certainty that C has at least one more card in the suit.

Late in a hand, the considerations with regard to the lead vary. If there is no indication to the contrary, it is best for each side to continue the suits originally opened by them. But the fall of the cards may show that it is disadvantageous to persevere in the suits first led. In such cases the player must have recourse to other and weaker suits. The general rules to be observed here are: to choose a suit in which there is reason to infer that the right-hand adversary is weak; or—but this is less favorable—one in

which the left-hand adversary is strong. In either case, if the suit chosen contains but three cards, none higher than knave, or only two cards, it is generally right to lead the highest.

The second player, as a rule, should play his lowest card, in order to preserve his strength in the leader's suit. The first trick in the suit is left to partner, who has an even chance of holding a better card than the third player. But if the second hand has a strong sequence, he should play the lowest of the sequence, by which partner's hand may be saved and a high card still remain over the original leader.

The following are the principal sequences:

With ace, king, queen—play queen.

With ace, king, etc.—play king.

With king, queen, knave—play knave.

With king, queen, etc.—play queen.

With queen, knave, ten—play ten.

With queen, knave, and one small—play knave.

When a high card is led, it is advisable for the second player sometimes to cover it with a higher one. The shortest rule is to put an honor on an honor, if with but two or three cards of the suit. With king or queen and four of the suit, it is better to pass an honor led.

When the second hand has none of the suit led, he should, as a rule, trump, if he has but two or three trumps; but he should not trump a losing card if he has more than three trumps, the reason of which will be explained when treating of the management of trumps.

The third hand, as a rule, plays his highest card, in order to support partner in his suit. The exceptions are, with ace, queen, etc., the queen is to be played; and if partner has begun with a high card, it is often right to pass it.

The management of trumps varies according to whether the player is strong or weak in them. If strong (i.e., with four or more), they should not be used for trumping, if it can be avoided, but should be kept together, in hopes of establishing a suit and of remaining with the long trump, with which to get the lead after the other trumps are out, and so to bring it in. Thus, if the opponents lead a losing or doubtful card, it is better, as a rule, not to trump it when holding four trumps. But if the opponents lead a winning card, it is, as a rule, better to trump it, though holding four trumps, than to pass it in hopes of bringing in a suit.

With five trumps, the chance of succeeding in exhausting the opponents' hands and of remaining with the long trump is so considerable that a player having five or more trumps should lead them; and as number is the principal element of strength, he should not be deterred from leading trumps merely because the fourth hand has turned up an honor.

With four trumps only, it is better first to lead the strong suit. When the adversaries' hands are cleared of that suit, or so far cleared that the holder of the long cards in that

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suit commands it, it is, as a rule, safe to lead from four trumps.

As a rule, less than four trumps should not be led from. But a player is justified in leading from weak trumps if he holds winning cards in every suit; if the adversaries are both trumping a suit; or if the game is lost unless partner has strength.

It is most important to return partner's trump lead at once, unless he has led from weakness; for partner, by leading trumps, declares a strong game, and it is then the best policy to abandon one's own plans and to support his.

It follows that a player should not, as a rule, lead a card for his partner to trump, unless he has four or more trumps; for with less than four trumps the player is weak; and if he forces his partner to trump, partner is weakened also; and the chances are that by weakening partner under such circumstances the command of trumps will remain with the adversaries.

But a player may force his partner, though weak himself, if partner has already been forced and has not afterward led trumps; if partner has already declared weakness in trumps, as by trumping a doubtful card second hand; if two partners can each trump a different suit; and when one trick from partner's hand wins or saves the game.

The same considerations which make it inexpedient to force partner when weak one's self show the advantage of forcing a strong trump-hand of the opponents.

When a player wishes trumps to be led by his partner, he throws away an unnecessarily high card followed by a lower one. This is called the 'signal' or *asking for trumps*. When the partner who has been thus signalled to also sacrifices an unnecessarily high card followed by a low one, he indicates that he also has a strong hand in trumps—i.e., at least 4. This is called the *echo*.

There are yet some general rules of play which have not been explained.

The second, third, and fourth players should always play the lowest of a sequence. The rule here given is in conformity with the play that would naturally be adopted in playing cards that are not in sequence; and by keeping to a uniform plan, players are enabled to infer what cards their partner does or does not hold. It is true that the adversaries often gain the same information; but it is found by experience that it is of more advantage to inform partner than to deceive the opponents.

As a rule, it is advisable to lead out the winning cards of partner's suit. The presumption is that he has led from his strong suit; and by leading out the winning cards, the suit is cleared for him, and his long cards are not obstructed. The reverse applies to suits led by the adversaries. It is mostly right to retain the winning cards of such suits as long as possible, in order to stop the establishment of them.

When a player has none of the suit led, he should, as a rule, throw away from his weakest suit; for by discarding from a strong suit, its numerical power is damaged. But

when the adversaries have shown great strength in trumps, it is not advisable to keep small cards of a long suit, as it is not likely that it can ever be brought in. Under such circumstances, the player should throw away from his best-protected suit, and keep guards to his weaker ones.

Players should watch the cards as they are played, and endeavor to infer from them where the others lie. Thus, if a player wins a queen with an ace it may be inferred that he has not the king, the rule being to win with the lowest; if a player leads trumps at starting, it may be inferred, as a rule, that he is strong in trumps, or has a very fine hand. By recording in this way, and by counting the number of cards played in each suit, skilled players will often, toward the close of a hand, know the position of all the important cards remaining in; and by means of this knowledge they will be able to play the end of the hand to the same advantage as though they had seen all the cards.

And lastly, and most important of all, players should play to the score. Thus, wanting but one trick to save or win the game, a winning card should be played at once. The example is stated as for one trick; but it should always be kept in mind how many tricks are requisite to win or save the game, or even a point, and the play should be varied accordingly.

AMERICAN LEADS.

Since 1884 what are known as 'American leads' have come into use. These were proposed by Nicholas Browne Trist, of New Orleans. The chief features of the system are: (1) In opening a numerically strong plain suit with a low card, always lead the *fourth-best* (instead of the lowest, as set forth above), thus informing partner that exactly three cards all higher than the one led are held by the leader. (2) In opening a strong suit with a high card followed on next round with a low card, that low card should always be the *fourth-best* counting from and including the one first led. This informs partner that exactly two cards intermediate in value between the two leads are held. (3) In opening a strong suit with a high card followed on second round with another high card, partner may be informed both as to the nature of the combination held and the number of the cards in the suit, if the lower of two high indifferent cards (queen or knave) left in the hand is led from a suit of five, and the higher of two such cards from a suit of four. Thus, if ace is led from ace, queen, knave, and small card, and then queen on second round, partner knows that the original lead was from a suit of four, and will not block the leader's command by playing king on queen. Therefore, from ace, king, queen, knave, and one small, lead knave, then ace; from ace, king, queen, knave, and two small, lead knave, then king; from ace, king, queen, knave, and three small, lead knave, then queen; the rule being that the greater the number of cards in the suit, the lower the indifferent card led on the second round.

The following are the

PRINCIPAL LEADS OF HIGH FOLLOWED BY HIGH:

From	Lead
A., Kg., Qu., Kn., and 3 small:	Kn., then Qu.
A., Kg., Qu., Kn., and 2 small:	Kn., then Kg.
A., Kg., Qu., Kn., and 1 small:	Kn., then A.
A., Kg., Qu., Kn., and no small:	Kg.,* then A.
A., Kg., Qu., and 3 small:	Qu., then Kg.
A., Kg., Qu., and 2 small:	Qu., then A.
A., Kg., Qu., and 1 small:	Kg.,* then Qu.
A., Kg., and 3 small:	A., then Kg.
A., Kg., and 2 small:	Kg.,* then A.
A., Qu., Kn., 10, and no small:	A.,† then 10.
A., Qu., Kn., and 2 small:	A.,† then Kn.
A., Qu., Kn., and 1 small:	A.,† then Qu.
Kg., Qu., Kn., 10, and no small:	Kg.,* then 10.
Kg., Qu., Kn., and 3 small:	Kn., then Qu.
Kg., Qu., Kn., and 1 small:	Kg.,* then Kn.
Kg., Kn., 10, and 2 small:	10, then Kn.
Kg., Qu., 10, and 1 small:	10, then Kg.
Qu., Kn., 10, 9, and no small:	Qu., then 9.
Qu., Kn., 10, and 2 small:	Qu., then 10.
Qu., Kn., 10, and 1 small:	Qu., then Kn.

In leading trumps the same rule is followed as in plain suits, except when leading from knave, ten, nine, etc., and when the value of the turn-up card suggests something different. Thus with queen, knave, nine, eight, two, the leader should begin with the two and not with the fourth-best, if partner turns up ace, king, ten, or seven; or with ace, queen, knave, and small, the leader should open with a small one, if ten is turned up by partner; or with ace, queen, ten, and small, with knave turned up at leader's right, the first lead should be queen. From knave, ten, nine, eight, lead knave, then eight; from knave, ten, nine, and two small, lead knave, then nine; from knave, ten, nine, and one small, lead knave, then ten; from ace and more than five small, lead ace, then fourth-best; from king, queen, ten, and more than one small, lead queen, then fourth-best; and so on. When a player who holds only four trumps is forced, he should trump with his fourth-best. If he then leads with a low card, he goes on with his lowest remaining card. When a player who holds five trumps is forced, he plays his fourth-best and continues with the lowest. In six-card suits the rule is to trump with the lowest but one, and then lead the fourth-best. When, after a force, a player holds such high trumps that he has to open the suit with a high card, he leads according to the number of trumps that he now holds, not according to the number that he held originally. Take first the case of four trumps, one of which has been used for trumping. From queen, knave, and two small ones, the fourth-best is led; from queen, knave, and one small one, the queen is led. Hence a player holding queen, knave, and two small ones and having been forced, should lead the queen. With five trumps the player who has been forced, and who then leads a high card, treats the suit as though he held only four

* An original lead of king signifies four in a suit.

† An original lead of ace signifies at least five in a suit, or ace, queen, knave.

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originally—for example, with ace, queen, knave, and two small ones, one having been used in trumping, ace, then queen (not knave), should be led. . . . With six trumps . . . , high cards are led after a force, as though five had been held originally' (Cavendish, *Whist Developments*, which see for an account of the modifications of the play of the second and third hands which are rendered necessary when American leads are adopted).

LAWS OF WHIST as adopted by the American Whist Congress held at Milwaukee, Wisconsin, 1891, Apr. 14-17:

SCORING.

1. Each trick above six shall count one point. The game shall consist of seven points. In case of tournaments, matches, and club scores, for purposes of comparison each hand shall be played out and every trick taken shall be scored. The above shall be the standard game, but players or clubs may, by rule or agreement, provide for other methods of scoring.

2. The penalty for a revoke shall take precedence of all other scores. [To *revoke* is to play a card different from the suit led when able to follow suit. The penalty for this error, whether intentional or accidental, is the forfeiture of three tricks: but see 45 below.]

3. If an erroneous score shall be proved, such mistakes can be corrected prior to the conclusion of the game in which it occurs, and such game is not concluded until the trump card of the first deal in the following game has been turned.

CUTTING.

4. In cutting, the ace is the lowest card. In all cases every one shall cut from the same pack, and if a player exposes more than one card he must cut again.

FORMATION OF THE TABLE.

5. In the formation of the table those first in the room shall have the preference. If, by reason of two or more arriving at the same time, more than four assemble, the preference among the last comers shall be determined by cutting a lower cut, giving the preference over all cutting high. A complete table shall consist of six. The four having the preference shall play.

6. The formation of the table having been determined, the players shall cut for partners and deal at the commencement of each game.

7. In cutting for partners the two highest shall play against the two lowest. The lowest shall have the deal and the choice of seats and cards, and must abide by his first selection. If the two lowest cut cards of equal value, they shall cut again for deal.

8. If two players cut intermediate cards of equal value those two shall cut again, and the lower of the new cut shall play with the original low.

9. If three players cut cards of equal value, those three shall cut again. If the fourth has cut the highest card, the two lowest of the cuts shall be partners, and the lowest shall

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have the deal. If the fourth cut the lowest card, he shall be the dealer, and the two highest of the new cut shall be partners.

10. At the end of the game, should there be more than four members belonging to the table, sufficient number of the players shall retire to admit those waiting their opportunity to play. In determining which players shall remain in, those who have played a less number of consecutive games shall have the preference over all who have played a greater number; and between two or more who have played an equal number, the preference shall be determined by cutting, a lower cut giving the preference over all cutting higher.

11. A candidate wishing to enter a table must declare such intention prior to any of the players having cut a card for the purpose either of commencing a new game or of calling out.

12. Tables may be formed and partners chosen by agreement, except when prohibited by a club rule.

SHUFFLING.

13. Before every deal the cards shall be shuffled and shall be presented by the dealer to his right-hand adversary to cut.

14. The pack must not be shuffled so as to expose the face of any card, nor during the play of the hand.

15. Where two packs are used, the dealer's partner shall collect and shuffle the cards for the ensuing deal and place them at his right hand.

CUTTING TO THE DEALER.

16. In cutting to the dealer not less than four cards shall be left in each packet.

17. If in cutting or in reuniting the separate packets a card is exposed, or if there is any confusion of the cards or doubt as to the place where the pack was separated, there must be a fresh cut.

18. When the pack has been presented by the dealer to be cut, and has been cut by the adversary in accordance with rules 16 and 17, should the dealer reshuffle the cards he shall lose his deal.

DEALING.

19. The fifty-two cards shall be dealt into four packets, one at a time in regular rotation, beginning with the player at the dealer's left; and, having been regularly dealt out, the last, which is the trump card, shall be turned up before the dealer.

20. There must be a new deal, first, if during the play of a hand the pack be proved incorrect or imperfect; second, if any card except the last be faced in the pack.

21. If, while dealing, the dealer or his partner exposes a card, and neither of the adversaries has touched the cards, the latter may claim a new deal. A card exposed by either adversary gives that claim to the dealer, provided his partner has not touched a card. If a new deal does not take place, the exposed card cannot be called.

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22. If the dealer before or during the deal looks at the trump card, his adversaries have a right to see it and may exact a new deal.

MISDEAL.

23. If the dealer distributing cards, I., gives more than two cards incorrectly; II., counts the cards on the table or the remainder of the pack; III., places the trump card on the other cards without having turned it up, it is a misdeal and the deal passes to the next player.

24. If after playing to the first trick a player is found to have less than his proper number of cards, and the missing card or cards be found in his adversaries' hands, the deal is void; if the missing card or cards be found in his partner's hand, the adversaries may consult and have the choice, I., of retaining the same hands and rectifying the error by drawing a card or cards, or, II., having a new deal.

25. A misdeal shall not lose the deal, if during the deal either of the adversaries has touched the cards prior to the dealer's partner having done so; but should the latter have first interfered with the cards, notwithstanding either or both of the adversaries have subsequently done the same, the deal is lost.

26. Should three players have their right number of cards and the fourth have less than thirteen, and such deficiency be not discovered until after he has played to the first trick, the adversaries may consult and shall have the choice; I., to claim a new deal; II., to have the hands played out as they stand, in which case the missing card shall be considered as played to the last trick, but no revoke shall be claimed because of such missing card.

27. If a pack of cards be imperfect, the deal in which the fault is discovered shall be void, but the previous ones shall hold good.

28. Any one dealing out of turn or with the adversary's cards may be stopped before the trump card is turned, after which the game must proceed as if no mistake had been made.

29. If the adversaries interrupt a dealer while dealing, either by questioning the score or asserting that it is not his deal, and fail to establish such claim, should a misdeal occur he may deal again.

THE TRUMP CARD.

30. The dealer, when it is his turn to play to the first trick, shall take the trump card into his hand. If left on the table after the second trick has been turned and quitted, it becomes an exposed card.

31. If the dealer takes the trump card into his hand before it is his turn to play to the first trick, he shall, at the request of his adversaries at any time before the second trick has been turned and quitted, replace it face up upon the table.

32. If the dealer, when called upon under the preceding rule to replace the trump card, declares himself unable to recollect it, his highest or lowest trump may be called, and, unless it cause him to revoke, must be played. The call

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may be repeated, but not changed—i.e., from highest to lowest, or *vice versa*—until such card is played.

EXPOSED CARDS.

33. The following are exposed cards: I. The trump card if left face upward on the table after second trick is turned and quitted. II. Two or more cards played at once. III. Any card exposed in any manner so as to be seen by a partner, no matter how exposed, whether dropped on the table, thrown on the table, or held above the table, detached or not detached.

34. A card is not an exposed card when dropped on the floor or elsewhere below the table.

35. All exposed cards shall be liable to be called, must be left face upward on the table, and must not be taken into the player's hand again; the player is bound to play them when they are called, provided he can do so without revoking. The call may be repeated whenever it is the player's turn to play, until the card is played. A player cannot be prevented from playing a card liable to be called; if he can get rid of it in the course of play, no penalty remains.

36. If a player leads a winning card—i.e., one better than any that his adversaries hold of the suit—and then leads another, or plays several winning cards without waiting for his partner to play, his partner may be called upon to take the first trick, and the other cards thus improperly played are exposed cards: it makes no difference whether he plays them one after the other, or throws them all on the table together; after the first card is played, the others are exposed.

37. A player having an exposed card on the table shall not play until the adversaries have stated whether or not they wish to call that card. If he plays another card without waiting, such card shall also become an exposed card.

LEADING OUT OF TURN.

38. If any player leads out of his turn, a suit may be called from him or his partner when it is next the turn of either of them to lead. The penalty shall be exacted by the player on the right of the one from whom the suit is called.

39. If a player leads out of turn and the other three follow him, the trick is completed and the error cannot be rectified; but if only the second or the second and third players have played to the false lead, the cards improperly played may be taken back, and such cards cannot be called; the original offender, or his partner, is liable to the penalty for leading out of turn.

40. If a player has none of the suit he is called on to lead, the penalty is paid.

PLAYING OUT OF TURN.

41. If the third hand plays before the second, the fourth hand may also play before the second.

42. Should the third hand not have played, and the fourth hand have played before his partner, the latter may

be called upon to play his highest or lowest card in the suit led, or, if he has none, to trump or not to trump the trick.

43. If any one omits playing to a trick, and such error is not discovered until he has played to the next, the adversaries may claim a new deal; should they decide that the deal stand good, the surplus card at the end of the hand shall be considered to have been played to the imperfect trick, but shall not constitute a revoke therein.

44. If any one plays two cards to the same trick, or mixes the trump card or any other card with a trick to which it does not properly belong, he shall be liable to the same penalty as provided in rule 26.

THE REVOKE.

45. It is a revoke when a player, holding one or more cards of the suit led, plays a card of a different suit.

46. The penalty for a revoke, I., is at the option of the adversaries, who at the end of the hand may consult together, and take three tricks from the revoking player and add them to their own, add three points to their own score, or deduct three points from his score (or all his points if he has less than three); II., can be claimed for as many revokes as occur during the hand; III., is applicable only to the score of the game in which it occurs; IV., cannot be divided—that is, a player cannot add one or two to his own score and deduct one or two from the revoking player; V., takes precedence of every other score.

47. A revoke is established if the trick in which it occurs has been turned and quitted, or if either the revoking player or his partner, whether in his right turn or otherwise, has led or played to the following trick.

48. At the end of a hand the claimants of a revoke may search all the tricks.

49. If a player discovers his mistake in time to save a revoke, the card improperly played becomes an exposed card. Any player or players who have played after him may withdraw their cards and substitute others. The card so withdrawn are not liable to be called.

50. If a revoke has been claimed, and the accused player or his partner mixes the cards before they have been examined to the satisfaction of the adversaries, the revoke shall be deemed established. A revoke may be claimed as soon as perceived, which claim shall be considered notification to the adversaries not to mix the tricks until they have been examined.

51. A revoke may be claimed at any time before the cards have been presented and cut for the following deal, but not afterward.

52. The revoking player and his partner may, under all circumstances, require the hand in which the revoke has been detected to be played out.

53. Should the players on both sides subject themselves to the penalty of one or more revokes, neither can win the game; each is punished at the discretion of his adversary, as provided in rule 46.

54. In whatever way the penalty is enforced, under no

circumstances can the player win the game by the result of the hand during which he has revoked, and he cannot score more than six.

MISCELLANEOUS.

55. If a player is legally called upon to play the highest or lowest of a suit, or to trump or not to trump a trick, or to lead a suit, or to play a card subject to be called, and unnecessarily fails to comply, he shall be liable to the same penalty as if he had revoked.

56. Any one during the play of a trick, and before the cards have been touched for the purpose of gathering them together, may demand that each player draw his card.

57. If any one, prior to his partner playing, calls attention to the trick in any manner, as by saying that it is his or his adversary's, or by naming his own or his adversary's card, or by placing any of the cards played without having been lawfully required so to do, his adversaries may require their opponent to play the highest or lowest of the suit then led, or, if he has none, to trump or not to trump the trick.

58. In all cases where a penalty has been incurred, the offender shall await the decision of his adversaries.

59. When a trick has been turned and quitted, it cannot again be seen until after the hand has been played.

60. Should any player say, 'I can win the rest,' 'The rest are all mine,' 'I have won the game,' or use words or signs to that effect, his hand shall be laid upon the table and treated as exposed cards.

61. No conversation shall be indulged in during the play of the hand except such as is required or permitted by the foregoing rules.

For more detailed information, the reader is referred to Professor P.'s Essay on the modern scientific game (Longman, Green, etc.); *Cavendish's Principles of Whist* (De la Rue & Co.); 'J. C.'s' Treatise on the game (Harrison); and *Cavendish's Whist Developments* (De la Rue & Co.); also *Foster's Whist Manual* (Brentano, New York 1891), in which is given an ingenious system of rules for play in all circumstances, which will repay careful study.

WHISTLE, *v.* *hwi's'l* [imitative of the sound made by the rushing of air: AS. *hwoesan*; Icel. *hræsa*, to breathe audibly, to hiss: Dan. *hvisle*; Icel. *hvisla*; Sw. *hwissla*, to hiss, to whistle]: to utter musical sounds and perform musical compositions in the manner of a wind-instrument by expelling or drawing in the breath through an orifice formed by contracting the lips; to utter musical sounds with a small wind-instrument; to sound shrill, as the wind; to call or signal by a whistle: N. the sound made by one who whistles; a small wind-instrument; the sound made by it; a call such as sportsmen use to their dogs; the shrill sound produced by the wind among trees, etc. WHIS'TLING, *imp.* -ling: ADJ. uttering musical sounds by contracting the lips; sounding with a pipe; making a shrill sound, as wind: N. the shrill sounds of a whistle, or those made by the wind. WHISTLED, *pp.* *hwi's'ld*. WHIS'TLER, *n.* -ler, one who

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whistles. WHIS'TLINGLY. ad. -lī. To WET ONE'S WHISTLE, to take a draught—that is, to wet the part which whistles, or the throat. To PAY TOO DEAR FOR ONE'S WHISTLE, to pay an excessive price for the gratification of some desire.

WHISTLER, *hwis'ler*, GEORGE WASHINGTON: civil engineer: 1800, May 19—1849, Apr. 7; b. at Fort Wayne, Ind. He was of a family of soldiers, his father, Maj. John W., serving in the revolutionary war, and subsequently in the U. S. army. He graduated at West Point 1819, and was assigned to topographical work, with an interval, 1821–2, as asst. prof. at West Point. Resigning from the army 1833, he was engaged in constructing the Baltimore and Ohio, the Boston and Albany, the Stonington and Providence railroads, and the canals at Lowell. While at Lowell, he planned the first three locomotives used by the Boston and Albany road, of which road he was chief engineer 1841–2, living in Springfield, Mass. In 1842 he undertook the St. Petersburg and Moscow railroad, and superintended its construction and the manufacture of its entire equipment, for which he was decorated by the emperor 1847. He died in St. Petersburg, and was buried at Stonington, Conn., having also a monument to his memory in Greenwood Cemetery, Brooklyn, erected by engineers.

WHIS'TLER, JAMES ABBOTT MCNEILL: artist: b. Lowell, Mass., 1834; son of George Washington W. While at West Point, he surpassed all others in art work, and is thought to have deliberately failed in examinations. On coming of age, he studied art in Paris under Gleyre; was brought into notice by his picture, *The White Girl*, in the Salon 1862, and by his etchings, which won a gold medal at the Hague. He afterward settled in London, where he was conspicuous for eccentricity of character and work, as well as for remarkable ability and originality, often shown in simple and striking color effects, named as such—e.g., *Nocturne in Blue and Gold*, *Harmony in Gray and Green*, *Arrangement in Black*, etc. In 1877 his eight paintings exhibited in the Grosvenor Gallery elicited severe criticism from Ruskin; a suit followed, resulting in damages of one farthing, long worn on Whistler's watch-chain. His peacock decorative painting of a room for Mr. Leyland is famous. He was made officer of the Legion of Honor 1892, when also an exhibition of his paintings in London was received with enthusiasm. He died in London, 1903, July 17.

WHISTON, *hwis'ton*, WILLIAM: English clergyman and mathematician: 1667, Dec. 9—1752, Aug. 22; b. Norton, in Leicestershire, of which place his father was rector. He entered at Clare College, Cambridge, where he distinguished himself in mathematics; he took his degree 1690, and obtained a fellowship 1693. The next year he became chaplain to Dr. More, Bp. of Norwich; and 1698 received the living of Lowestoft, in Suffolk. In 1696 appeared his *Theory of the Earth*, which, despite, or perhaps because of, the oddity of some of its speculations, procured him considerable reputation. In 1703 by the express influence of

Sir Isaac Newton, he was appointed to succeed him in the Lucasian professorship at Cambridge; whereupon he gave up his living, and settled at the university. He continued in clerical work; and such was his success as a preacher, that he would probably have attained high position in the church, had not the development of his theological opinions led him into Arian heresy—his frank avowal of which, at once in preaching and writing, led to his expulsion from his professorship and the univ. 1710. In the same year appeared the most noted of his original writings, *An Historical Preface to Primitive Christianity Revived*. His subsequent prosecution in the church courts forms a curiously complicated chapter in the history of such matters. After five years of suspense, during which the proceedings swayed strangely hither and thither, W. was permitted to remain formally a member of the Church of England. By many of the clergy, however, much dissatisfaction was expressed; and some even refused to admit him to communion. When Halley, 1720, proposed him as a member of the Royal Soc., W.'s old friend Newton successfully opposed his admission. W. himself, the most amusingly vain of men, was convinced that Newton's conduct was dictated by jealousy of his superior scientific genius—a notion in which probably few agreed with him. Having no ostensible means of livelihood, W. was frequently reduced to great straits; but he had kind friends, ready to assist him at need. In dissemination of his religious opinions he continued unwearied. He also busied himself much with scientific crotchets. Of his numerous works, a translation of Josephus was the only one which perpetuated his name, and of this there have been several reprints. His *Memoirs of his own life* (3 vols. 1749–50) is a curious specimen of self-portraiture, vividly depicting this whimsical, eccentric, but thoroughly conscientious man. His Arianism was developed not at all from a rationalizing tendency, but entirely from his conception of the tenets of the primitive church. He held stoutly to supernatural Christianity, and earnestly defended prophecy and miracle—even advocating anointing the sick and touching for the king's evil.

WHIT, n. *hwīt* [AS. *wiht*, a creature, a thing; Goth. *vaiht*, a thing (see also WIGHT 1)]: a small part; an atom or least bit; a point; a jot.

WHITAKER, *hwīt'a-kēr*, DANIEL KIMBALL, LL.D.: editor: 1801, Apr. 13—1881, Apr. 10; b. Sharon, Conn.; grandson of the Rev. Nathaniel W. He graduated at Harvard 1820, studied law, and settled in S. C., becoming the law partner of ex-Gov. John Lyde Wilson. Though eminently successful as a lawyer, his preferences were for literature, and he established and edited a number of periodicals, among them the *Southern Literary Journal* and *Whitaker's Magazine*. In 1841 he established at Charleston, S. C., the *Southern Quarterly Review*, which he edited until the civil war. In 1866 he moved to New Orleans, La.; and founded and for many years edited the *New Orleans Monthly Review*. He was corr. sec. of the New Orleans Acad. of Sciences. He died in New Orleans.

WHITAKER—WHITBY.

WHITAKER, NATHANIEL, D.D.: 1732, Feb. 22—1795, Jan. 21; b. Long Island, N. Y. He graduated at Princeton 1753, and from that time till 1761 was pastor of a Presb. church at Chelsea (near Norwich), Conn. In 1766 the Conn. branch of the Scotch Soc. for the Advancement of Learning sent him to England, Scotland, and Wales, to solicit aid for educating and Christianizing the N. Amer. Indians. The Rev. Samson Occum (q.v.), a Mohican Indian, educated at the school of the Rev. Eleazar Wheelock (q.v.), accompanied him. The Earl of Dartmouth, then sec. of American affairs, by his influence and by his own contributions materially assisted them; and their mission was so successful that during their two years' absence the sum of £11,000 (about \$55,000) was raised; and until the revolution additions were made to this from time to time. This sum was placed in the hands of trustees as an endowment for Moor's Indian Charity School, from which Dartmouth College grew. After his return from Europe, W. built at his own expense, and for many years preached in, what was known as the Tabernacle Church at Salem, Mass. In the revolution he warmly supported the cause of the colonies. The last years of his life were spent at Woodbridge, Va., where he died. Some of his sermons have been published.

WHITBY, *hwit'bi*: market-town and thriving seaport of England, in the N. Riding of Yorkshire, on both sides of the mouth of the Esk; 54½ m. n.n.e. of York by railway, 247 m. n. of London. A stone bridge, with a swivel admitting vessels into the inner harbor, connects the two parts of the town. Two piers, the w. one about 1,560 ft. long, extend into the German Ocean, and protect the outer harbor, which is further protected by two inner piers. On a cliff about 350 ft. high stands the parish church, approached from the town below by a flight of nearly 200 steps. There are dry-docks for building and repair of ships. Iron and jet ornaments are extensively manufactured—the jet found in the vicinity having a world-celebrity. Alum and ironstone—the latter found in great quantities—are exported. Of late, W. has risen into importance as a watering-place. The old part of the town is interestingly antique and picturesquely irregular: the new part has the usual appearance of a fashionable watering-place.—In 1886 there entered 384 vessels, of 48,439 tons; cleared 371, of 48,504 tons.—Pop. (1881) 14,086: (1891) 13,274.

The Saxon name of W. was Streoneshalch; but when the Danes took possession of it they called it Whitby (white town), just as they changed the Saxon Northweorthing into Deoraby or Derby. The termination *by*, characteristic of Danish settlements, is a corruption of the Old Norse *byr*, modern Icelandic *boer*, dwelling, farmstead, town. In Devon the suffix occurs in the form *bere* or *beer*, as in Rockbere, Larkbeer.

WHITBY—WHITE.

WHITBY, *hwīt'bi*, DANIEL, D.D.: theologian notable for learning, and for changeableness of views: 1638–1726, Mar. 24; b. Rushden, Northamptonshire, England. He graduated at Trinity College, Oxford, about 1657, and 1664 obtained a fellowship there; took orders in the Church of England, and after several preferments was made rector of St. Edmund's, Salisbury. He became a distinguished commentator and controversialist; and published, with other works, *The Protestant Reconciler*, a plea for the toleration of dissenters, which was violently opposed and condemned to be burned. Afterward W. wrote in favor of views exactly opposite. In 1703 he published *Paraphrase and Commentary on the New Testament*, a commentary of the old school of orthodoxy. But in a few years he issued his *Discourse* (1710) attacking Calvinism. Later he became a strong Arian.

WHITCHURCH, *hwīt'chérch*: small market-town of Shropshire, England; on a height, 20 m. n.e. of Shrewsbury by railway. There is trade in malt, hops, and shoes.—Pop. (1871) 3,696; (1881) 3,756; (1895) 6,647.

WHITCOMB, *hwīt'kūm*, JOHN: soldier: about 1720–1812; b. Lancaster, Mass. He was col. of Mass. troops in the campaign against Crown Point 1755, and at the beginning of the revolution commanded a regt. at Boston. He was appointed brig.gen. by the provincial congress, and 1776, June 5, was made brig.gen. by the continental congress. On June 13 of the same month he was commissioned maj.-gen. in the Mass. service, but soon afterward he resigned.

WHITE, a. *hwīt* [Dut. *wit*; Ger. *weiss*; Dan. *hvid*; Goth. *hveits*; Icel. *hvítr*; Skr. *çveta*, white]: without color, or having the hue or color of pure snow, or approaching to it; transmitting and reflecting to the eye all the rays of the spectrum combined; *figuratively*, pure; innocent; unclouded; purified from sin; pale, bloodless, as, a *white* face; of silver, as, *white* money; dressed in white, as, a *white* friar; favorable, auspicious, as, a *white* day; in *OE.*, favorite, darling, as, a *white* son: N. one of the natural colors of bodies like pure snow; opposite of *black*, but, like black, not a true color; a color resulting from a certain combination of all the prismatic colors; a white man, as opposed to a black man; albuminous part of an egg; the central mark in an archery target: V. to make white in color. **WHIT'ING**, imp.: N. a well-known sea-fish of the cod tribe; pulverized chalk cleared from stony matter, often made up into cakes. **WHITED**, pp. and a. *hwīt'tēd*, made white; beautifully clean and polished externally. **WHITE'NESS**, n. *-nēs*, state of being white; purity; freedom from stain or blemish. **WHIT'ISH**, a. *-tīsh*, white in a moderate degree. **WHITEN**, v. *hwīt'tn*, to make white; to blanch; to turn or become white. **WHITENING**, imp. *hwīt'nīng*: N. pulverized chalk freed from stony matter, used for polishing and whitewashing; also spelled *whiting*. **WHITENED**, pp. *hwīt'tēnd*, bleached. **WHITE'LY**, a. *-lī*, in *OE.*, nearly white; pale in color. **WHITE'NER**, n. *-nēr*, one who or that which makes white. **WHITES**, n. plu. *hwīts*, Leucorrhœa (q.v.), a disease of females: fine wheat-flour; a mixture of flour and alum.

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WHITE'BOYS, a name given to a secret association which arose in Ireland, first in the county Tipperary, about 1760, having for members the discontented peasantry, who roamed about at night wearing *white* shirts over their clothes, and committing dastardly outrages—the assoc. having for its object the redress of serious grievances in the exaction of tithes for a church which was not the church of the people, and in regard to the tenure of land.

WHITE'BOYISM, n. the practices of the Whiteboys. **WHITE-BROWN**, a color between brown and white. **WHITE'BAIT**, a small delicate fish much prized. **WHITECHAPEL-CART** [from *Whitechapel*, in London]: a small spring cart, two-wheeled. **WHITE CLOVER**, a small species of clover bearing white flowers; Dutch clover, *Trifolium repens*, ord. *Leguminosæ*. **WHITE'-COPPER**, *pak-tong*, an alloyed metal of a white color, used by the Chinese, composed of copper, zinc, and nickel, with a small proportion of iron; German-silver, which is but a modification of the same alloy. **WHITE CROPS**, crops of grain, which assume a white color as they ripen—opposed to *green* crops, as turnips, etc. **WHITE ELEPHANT**, anything which can never be other than an expensive and ruinous honor or burden—referring to the rare white elephants of the king of Siam, and their expensive maintenance. **WHITE FRIAR**, a monk of the Carmelite order—so called from the color of their clothes. **WHITE HEAT**, that degree of heat given to iron in which it appears as white. **WHITE HOUSE**, official mansion of the president of the United States, at Washington, D. C.—named from its color (see **WASHINGTON** [city, D. C.]). **WHITE LEAD**, a carbonate of lead in the form of a white powder, much used in giving a body to paints; ceruse (see **LEAD**). **WHITE LIE**, a lie for some trivial purpose or for which an excuse can be found. **WHITE LIGHT**, the light which comes directly from the sun. **WHITE'-LIVERED**, a. pale; feeble; sickly—so called from the appearance being popularly ascribed to a white liver; envious; malicious; cowardly. **WHITE ROSE**, the emblem of the House of York. **WHITE'SMITH** (see under **SMITH**). **WHITE SQUALL**, a sudden storm of wind with a bright sky. **WHITE'-STONE**, a name given by lapidaries to limpid and colorless rock-crystal when cut for jewelry. **WHITE SWELLING**, a disease of the joints—so called from the altered color of the skin (see **JOINTS**, **DISEASES OF**). **WHITE'THORN**, n. *-thawrn*, the hawthorn, a prickly shrub, extensively employed in forming hedges; the *Crataegus oxyacan'tha*, ord. *Rosacææ*. **WHITE'-VITRIOL**, sulphate of zinc (see **ZINC**). **WHITE'WASH**, n. a liquid composition of slaked lime reduced to the consistency of milk, or of whiting, size, and water, for making a large surface white, such as the walls of a house—used also as a disinfectant; a wash for making the skin fair: **V.** to cover with a liquid composition of slaked lime or of whitening; to give a fair external appearance to; *familiarly*, to clear a bankrupt of the debts he owes by a judicial process; to acquit a person of any dishonorable charge. **WHITE'WASHING**, n. the act of covering with whitewash: *familiarly*, the act of freeing a bank-

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rupt from his debts by legal process. WHITE' WASHED, pp. WHITE' WASHER, one who whitewashes. WHITE'-WATER, dangerous disease peculiar to sheep. WHITE WINE, any wine similar in color to sherry, as distinguished from *red* wine, port, claret, etc. TO SHOW THE WHITE FEATHER, to give proof of cowardice, referring to the pure-bred gamecock, which has no white feather on it.

WHITE, *hwit*, ANDREW DICKSON, LL.D.: first president of Cornell University: b. Homer, N. Y., 1832, Nov. 7. He graduated at Yale 1853, with the highest honor of his class; after which he studied two years in Europe and one year at Yale, accepting a professorship of hist. and Eng. lit. in Mich. Univ. 1857. Resigning 1862, he lived in Syracuse, N. Y., and was state senator 1862-66, during which time he promoted the public-school system, and came into association with Ezra Cornell, to whose wish to found an institution in which 'any person can find instruction in any study.' he gave shape. He was pres. of Cornell Univ. 1867-85; U. S. commissioner to Santo Domingo 1871, and to the Paris exposition 1877; and U. S. minister to Germany 1879-81. In 1887 he founded the dept. of hist. and polit. science in Cornell, giving to it his rich historical library, valued at more than \$100,000. He was appointed minister to Russia 1892; a member of the Venezuelan Commission, 1895-96; president of the American delegation to the International Peace Congress at The Hague in 1899; Ambassador to Germany 1897-1902. He has published *The New Germany* (1882); *On Studies in General Hist. and the Hist. of Civilization* (1885); *Hist. of the Doctrine of Comets* (1886); *History of the Warfare of Science with Theology* (1896).

WHITE, ANTHONY WALTON: officer in the revolution: 1750, July 7—1803, Feb. 10; b. New Brunswick, N. J. His mother was daughter of Gov. Lewis Morris, of N. J., and his father wealthy. In 1775 he was appointed on the staff of Gen. Washington, with rank of maj., and promoted to lieut.col. the next year, after which he was in active service in the north until 1780, when, commissioned col., he was chief commander of cavalry in the south. Defeated at first by Col. Tarleton, he was afterward successful in several actions. On the evacuation of Charleston, S. C., 1782, he generously gave security for the pay of his troops; and the sacrifice of his property to meet the obligations, with other reverses, exhausted his resources. After residing in New York, he returned to New Brunswick, N. J., where he died.

WHITE, EDWARD DOUGLAS: jurist: 1845, Nov.—
———; b. Lafourche par., La. He was educated at Mount St. Mary's Coll., Emmitsburg, Md.; at the Jesuit Coll. of New Orleans, and at Georgetown Coll., D. C.; was a Confederate soldier; studied law and was admitted to the bar; was elected state senator of La. 1874; appointed assoc. justice of supreme court of La. 1878, and 1891 was elected to the U. S. senate as a democrat. In 1894 he was appointed by Pres. Cleveland assoc. justice of the U. S. supreme court.

WHITE, GILBERT: author of the *Natural History and Antiquities of Selborne*: 1720, July 18—1793, June 26; b. Selborne, a little village in Hampshire, England. Educated at Oriel College, Oxford, he received his M.A. degree 1746, and 1752 was made a senior proctor of the univ.; was ordained and became a country curate 1753; but retired to his native village 1755. After 1758 he became curate of the neighboring parish of Faringdon; from 1784 till his death he ministered in the curacy of Selborne. He repeatedly declined valuable livings in other parishes. His charming *Natural History and Antiquities of Selborne* (1789) has made W. an indisputable English classic. Probably no book on natural history has been more frequently reprinted. It is a collection of miscellaneous jottings, unsystematized, unpretentious; but fresh, graphic, full of keen observation and luminous interpretation, and revealing throughout a delightfully loving and gentle and, as one might say, sociable view of nature. W. had friendships with the birds, the squirrels, the plants of which he wrote. There is an ed. by Prof. Bell (1877), and one by Frank Buckland, with a chapter on antiquities by Lord Selborne (1875). W.'s MS. journal, comprising letters and poems, in 6 vols., was found 1880.

WHITE, HENRY KIRKE: English poet: 1785, Mar. 21—1806, Oct. 19; b. Nottingham, in which place his father was a butcher. At the age of 15 he was apprenticed to an attorney; and, while diligent in his business, his leisure was passionately devoted to literature, especially poetry. He began to attract notice by his fluency and ability as a speaker. He published 1804 a small volume of poems, which had merciless treatment from the critics, and little acceptance with the public; but secured him influential friends, notably Southey, and the Rev. Mr. Simeon, through whose influence a sizarship in St. John's College, Cambridge, was procured for him. In his studies he highly distinguished himself; but his ardor in them soon broke down his delicate constitution, and he died of consumption. The next year two vols. of his *Remains* were published by his friend Southey, with a pleasing Memoir of the deceased poet. W.'s poetry, however, is now almost forgotten.

WHITE, HORACE: journalist: b. Colebrook, N. H., 1834, Aug. 10. In 1837 his father, a physician, removed to Beloit, Wis., but died while W. was a child. He graduated at Beloit College 1853. After his graduation he entered journalism and soon became connected with the *Chicago Tribune*. He was its editor 1864-74, and was one of the proprietors. In 1883, in association with Edwin L. Godkin, he became ed. of the *New York Evening Post*, which position he still (1903) holds. He is also an author and translator. He edited Frederic Bastiat's *Sophismes Economiques* (1869) and Luigi Cossa's *Scienza delle Finanze* (1888).

WHITE, JOHN (Patriarch of Dorchester): clergyman: 1575-1648, July 21; b. Stanton, St. John, Oxfordshire, England. He was educated at Winchester and at Oxford, and obtained a life fellowship at Oxford 1595. In 1606 he was appointed rector of Holy Trinity Church, Dorchester.

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In 1643 he became one of the Westminster Assembly of Divines, and 1645 rector of Lambeth. He advocated and efficiently promoted the colonization of New England by those who could not conscientiously conform to the usages of the established church; and 1630 founded at Mattapan, Mass., a colony of 140 Puritans from Dorsetshire and adjacent counties. He published a number of works.

WHITE, JOHN BLAKE: lawyer, artist, and author: 1781, Sep. 2—1859, Aug. 24; b. near Eutaw Springs, S. C. He began the study of law; but in 1800 went to England, and for four years studied painting with Benjamin West. He returned to the United States 1804, and in 1805 opened a studio in Boston, but soon removed to Charleston, S. C., and completed the study of law, which he ever after practiced, painting only as a relaxation. He served in the S. C. legislature a number of terms. In 1840 he received a gold medal from the S. C. Institute for the best historical painting, and 1847 was elected an honorary member of the National Acad. Among his paintings are the *Battle of Eutaw Springs* and *Battle of New Orleans*, and among his portraits those of Charles C. Pinckney and John C. Calhoun. He published several dramas. He died in Charleston.

WHITE, JOSEPH BLANCO: author and clergyman: 1775, July 11—1841, May 20; b. Seville, in Spain; son of a merchant there of Irish parentage, who had married a Spanish lady of old Andalusian family. In 1799 he was ordained a Rom. Cath. priest; but his mind was naturally restless and inquisitive; and 1810 he went to England, and joined the English Church—though not becoming one of its priests. He became a tutor in the family of Abp. Whately 1831; and with a mind at once pious and skeptical, still in wistful quest of a religion, embraced Unitarianism, settled in London, and conducted a monthly Spanish paper, *El Español*. Though in literary circles recognized as a man of fine talent, and known as a contributor to periodicals such as the *Quarterly* and *Westminster Reviews*, he made no permanent impression on the public by his more formal publications. Of these the most important were: *Letters from Spain* (1822); *Practical and Internal Evidence against Catholicism* (1825); *Second Travels of an Irish Gentleman in Search of a Religion* (2 vols. 1833). He died in Liverpool, whither he had removed some years before; and four years afterward appeared his most interesting book, *The Life of the Rev. Joseph Blanco White, written by himself; with Portions of his Correspondence*; ed. by John Hamilton Thom (London 3 vols. 8vo).—His sonnet addressed *To Night* ('Mysterious Night') has been pronounced one of the finest in any language.

WHITE, PEREGRINE: 1620, Nov. 20—1704, July 22; b. on the *Mayflower* in the harbor of Cape Cod—the first white child born in New England; son of William and Susanna W., pilgrims on the *Mayflower*. His father died in the first dreary winter at Plymouth, and soon afterward his mother married Edward Winslow, the first provincial gov. of New England, and theirs was the first English marriage in this country. W., who was 'of vigorous

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and comely aspect,' became a resident of Marshfield, Mass., and the court gave him 200 acres of land there in 'consideration of his birth.' He held a number of unimportant offices, civil and military. He died at Marshfield.

WHITE, RICHARD GRANT: Shakespearean scholar: 1821, May 22—1885, Apr. 8; b. New York. He graduated at the Free Acad. (now College) of the City of New York 1839. After study of medicine and then law, he turned to journalism; founded a paper, *The Alleghanian*; edited a comic paper, *Yankee Doodle*, 1846; was dramatic, musical, and art critic of the *New York Courier and Enquirer*, and its editor 1854-59; and of the *World* 1860-1, of which he was a founder. His letters to the *London Spectator* were helpful to the Union cause during the civil war.—Among his works are: *Handbook of Christian Art* (1853); *Shakespeare's Scholar* (1854); annotated variorum edition of Shakespeare, 12 vols. (1857-65); *National Hymns* (1861); *Memoirs of Shakespeare* (1865); *The New Gospel of Peace*, a satire (1866); *Words and Their Uses* (1870); *Every-day English* (1881); and *The Fate of Mansfield Humphrey*, a novel (1884). He also edited the Riverside edition of Shakespeare. After his death in New York, was published *Studies in Shakespeare* (1885).

WHITE RIVER: stream in Ark. and Mo.; rising in the Ozark Mountains, flowing n.e. into Mo., then turning e. and s.e. into Ark., draining the n.e. portion of the state, and flowing s. into the Mississippi near the mouth of the Arkansas. It is 800 m. long, navigable 350 miles.

WHITE RIVER: stream in Ind.; formed by two branches, East and West Forks, which unite at the s.e. extremity of Knox co., 30 m. in a direct line from its mouth. Its course is w.s.w., and it empties into the Wabash nearly opposite Mt. Carmel, Ill., 25 m. below Vincennes. It is 50 m. long. The longer or West Fork rises in Randolph co., flows w. to Hamilton co., then w.s.w. through Marion, Morgan, Owen, and Greene cos. It is 300 m. long and navigable 150 m. or to Martinsville. The East or Driftwood Fork rises in Henry co., and flows s.w. through Shelby, Bartholomew, Jackson, and Lawrence cos. It is called Blue river in the first part of its course; is 250 m. long and navigable to Rockford.

WHITE, STANFORD: architect: b. New York, 1853, Nov. 9; son of Richard Grant W. He was a pupil of the architects Charles D. Gambrill and Henry H. Richardson, and was their principal assistant in building Trinity Church, Boston, and other edifices with which the name of Mr. Richardson is especially associated. After study in Europe 1878-80, he established himself in New York, where he has furnished the architectural designs for the statues of the sculptor St. Gaudens, an example of which is the original plan for the base of the statue of Farragut in Madison Square. He is also the author of quaint designs for book and magazine covers, such as those of the *Century*. Among his latest and most beautiful architectural designs are the Washington Arch on Washington Square, facing the foot of Fifth ave., New York; and the 'Madison Square Garden' structure, at the n.e. corner of that square.

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WHITE, STEPHEN VAN CULEN: lawyer and financier: b. Chatham co., N. C., 1831, Aug. 1. His father belonged to the Soc. of Friends, and, refusing to act as guardsman after the Nat Turner insurrection, was obliged to leave, removing to Ill. The son graduated at Knox Coll. 1854; studied law with Benjamin Gratz Brown and John A. Kasson, in St. Louis, settling with the latter in Des Moines, Io. He soon became known for ability, especially in some cases of public interest in the U. S. court; and 1864 acted as district atty. of Io. In 1865 he opened a banking office in New York, and has distinguished himself in successful speculative enterprises. In 1886 he was elected to congress. He has long been a prominent member of Plymouth Chh., Brooklyn; is an amateur astronomer, with a private observatory; and was first pres. of the Amer. Astronomical Society.—In 1891, Sep. 22, the firm of which W. was the senior member, and which had been trying to carry through a 'corner' in September corn, was obliged to suspend, and an assignment was made to Charles W. Gould; but W.'s creditors had such entire faith in his business integrity and honor, that they offered him every chance to resume; and 1892, Feb. 1, he was restored to membership in the stock exchange. Within a year he paid every debt in full with interest.

WHITE, WILLIAM, D.D.: first Prot. Episc. bishop in America who was publicly consecrated by English prelates: 1748, Apr. 4—1836, July 17; b. Philadelphia. He graduated from the college in that city 1765, and, after studying theology, was ordained deacon in England 1770, and, 16 months subsequently, priest. He then returned to this country and was successively asst. and rector of three combined parishes in Philadelphia, known as Christ Church. There the first council which included laymen met 1784, and the next year he presided at a general convention in the same place, made the first draft of the church constitution, and had large part in modifying the liturgy, also writing an address to the English prelates, soliciting a regular episcopate. Elected 1786 as first bp. of Penn., he, with Dr. Samuel Provost, of New York, was consecrated as bishop in Lambeth Palace 1787, Feb. 4. On his return he was appointed chaplain of congress, continuing as such 14 years. He was pres. of the first Bible soc. in America, that of Philadelphia, and of a prison soc., and of various charitable institutions. He died in Philadelphia. Bp. W. was a man of lovable disposition, fervent piety, zealous activity, and sound judgment. Such leadership as his was an immense service to his church in this country at a critical period of its history. The centenary of his Episc. consecration was observed in his church in Philadelphia, also in Lambeth Palace. Besides many addresses he published *Lectures on the Catechism* (1813); *Comparative View of the Controversy between Calvinists and Arminians* (1817); *Memoirs of the Prot. Episc. Church in the United States* (1820); and his opinions on exchanging pulpits with non-Episc. ministers were published 1868. See memoir by Bird Wilson, D.D., 1839.

WHITEBAIT.

WHITEBAIT: a small fish, called by Valenciennes *Rogenia alba*, and for which he constituted the genus *Rogenia* as a distinct genus of the Herring family (*Clupeidæ*), but which is now regarded by naturalists as merely the fry of the herring or of similar fish. The W.-fishery is actively prosecuted on some parts of the British coast, particularly



Whitebait.

In the estuary of the Thames, where the W. is very abundant in spring and summer, beginning to appear in the end of March or early in April. Adult W. are caught on the coasts of Kent and Essex during winter, and in this condition are about 6 in. in length. W. is found also in the Forth. It is much in request as a delicacy for the table. At the time when ordinarily captured, W. are only from $1\frac{1}{2}$ to 4 in. in length. They are caught by means of bag nets sunk 4 or 5 ft. below the surface of the water. For several months they continue to ascend the river in shoals with the flood-tide, and descend with the ebb tide, not being able to live in fresh water. They are fried with flour or crumbs; they are often laid on a napkin and sprinkled with fine flour and a little salt, rolled about till well covered with flour, and then thrown into a pot of boiling lard, where they remain till they are of a pale straw-color. Londoners resort to Greenwich and Blackwall to enjoy W. dinners. It has become the practice of her majesty's ministers to repair to Greenwich for a W. dinner every year before the prorogation of parliament in autumn. Some of the corporations of London indulge in a similar annual festivity.—The W. has the body more compressed than the mature herring; belly serrated; lower jaw longer than the upper; scales very soft, small, and thin, and very easily rubbed off; color silvery white, greenish on the back. The food of the W. seems to consist of minute crustaceans. It is probable that under the name W. the fry of all the British *Clupeidæ*—the pilchard, the sprat, and the shad—are indiscriminately taken and used like the fry of the herring.

WHITEBOY—WHITE-CROSS SOCIETY.

WHITE'BOY: old term of endearment applied to a favorite son, dependant, or the like; a darling.—In Ireland the name was given to a member of a secret agrarian association organized about 1759,60. It was composed of starving laborers, evicted tenants, and others in a like situation, who assembled at night to destroy the property of harsh landlords, or of their agents the Prot. clergy, of tax or tithe collectors, and of others who had made themselves obnoxious: in many cases they went so far as to commit murder.

WHITE-BRETH'REN: in *chh. hist.*, a body of enthusiasts who appeared in Italy at the beginning of the 14th c., and, under the leadership of a priest claiming to be Elias the prophet, declared a crusade against the Turks, to obtain possession of the Holy Land. They were met at Viterbo by the papal troops, and were dispersed; and their leader was burned as a heretic at Rome 1403.

WHITE COLORS: white pigments used by painters, the principal being: (1) *White Lead* (see **LEAD**), used not only as a color, but to form the body of most oil-paints: (2) *Derbyshire White*, sulphate of baryta: (3) *Pearl White*, or trisnitate of bismuth: (4) *Zinc White*, or hydrated oxide of zinc.

WHITE-CROSS SOCIETY: a society instituted about 1883, at Bishop-Auckland, England, to urge on men the obligation of personal purity; to raise the tone of public opinion upon questions of morality; and to inculcate a respect for womanhood. The institution of such societies has extended to the United States.

WHITEFIELD.

WHITEFIELD, *hwit'fēld*, GEORGE: one of the founders of Methodism, and one of the most renowned of pulpit orators: 1714, Dec. 16—1770, Sep. 30; b. Gloucester, England, in the Bull Inn, of which his father was landlord. He was educated at the grammar school of his native town, at which he appears to have distinguished himself, especially by elocutionary displays at the annual visitations. He was for a time engaged assisting as a common drawer in the business of his mother, the hostess of the Bull Inn; but he returned to school, prepared for the univ., and 1733 obtained admission as a servitor at Pembroke College, Oxford. About three years earlier John and Charles Wesley (see these titles) had laid, in the Univ. of Oxford, the foundations of Methodism—a system which, at first, resembled the rule of a religious order more than the bond of a religious sect, requiring from its professors ascetic observances and devotion to works of piety and charity. W. had been more than a year at the univ. before he came under the influence of the Wesleys and became associated with the Methodists. He at once made himself remarkable among them for zeal, for the austerity of his asceticism, for labor too great for his strength among the sick and the prisoners in the jail. His health gave way, and he had to go home for restoration in his native air; after which he continued at Gloucester the same pious and self-denying practices which he had begun at the university. This drew the attention of Bp Benson, who offered, though W. was only 21 years old, to admit him immediately into orders. The offer was accepted, and W. was ordained deacon 1736, before he had taken his degree. He preached his first sermon in Gloucester Cathedral, with remarkable effect. The vehemence and earnestness of his oratory deeply moved the audience; and five persons are said to have been driven wild with fear and excitement. When complaints were made to the bishop, the good man gave no heed to them—simply saying that he hoped the madness would last till the following Sunday. During the next two years W. made evangelizing tours, preaching in Bath, Bristol, and other towns, and attracting immense multitudes.

Meanwhile Wesley had been in America, establishing missions among the colonists; and in 1736 he invited W. to join him, and the invitation was accepted. W. had to go to London to arrange for his journey; and there he preached in various churches. This visit, though not his first, seems first to have made him known to the inhabitants of the metropolis, on all classes of whom—fine gentlemen like Chesterfield, and cool skeptics like Bolingbroke, as well as the more mobile crowd—he afterward made an impression such as probably no other preacher ever produced. His success in London was immediate, and much beyond all that had befallen him previously. The doors of the church in which he was to preach were besieged before the dawn; the unlighted streets in the early morning were filled with persons carrying lanterns, making their way to the place of worship many hours before the time

of service. This lasted until his departure (1737, Dec. 28) for America, where he arrived 1738, May 7. He was thereafter to be almost as closely connected with evangelical labors in America as in England itself; but on this first occasion his stay was short—only a few months. He returned to be admitted to priest's orders, and to collect funds for establishing an orphanage in Georgia. He soon went back to America, but not before a beginning had been made of his split with the English Church, whose clergy he offended by preaching in the open air, with or without permission from the parish clergyman, and by deviating, whenever he thought fit, from the liturgy of the church. But the remarkable and beneficial effects of his preaching on the rude miners and others who flocked to hear him, consoled him for clerical censures; and after this he seems to have preached almost by preference in the open air. He sailed 1739, Aug., on a second visit to America, where he remained nearly two years, preaching in all the principal towns and awakening widespread religious interest.

About the time of his return to England, 1741, doctrinal differences led to his separation from John Wesley—both of them being by this time disowned by the Established Church. Wesley believed and preached the Arminian doctrine of universal redemption (see ARMINIUS, JACOBUS); W. was a rigid Calvinist (see CALVIN, JOHN: CALVINISM). Each, unfortunately, after the universal fashion of those days, thought his belief of the utmost importance; and in the end each excommunicated the other. W.'s supporters now built him a large shed at Moorfields, near Wesley's chapel—which, being temporary, was known as the Tabernacle; and his preaching gathered immense audiences. But he had none of that talent for organization with which John Wesley was so richly endowed; and as soon as he went away on his frequent and protracted journeys, his supporters began to disperse. If it had not been for the Countess of Huntingdon, a lady of wealth and abilities, who became a convert to his views, W. probably would not have founded a sect. But this lady appointed him her chaplain; she built and endowed Calvinistic Methodist chapels to maintain his doctrines; thus a slight memorial of W.'s preaching, though it commemorated more directly the zeal and energy of Lady Huntingdon, remains in what is known as the Countess of Huntingdon's Connection: see HUNTINGDON, SELINA. The countess also established a college for training candidates for the ministry.

One of his most famous missionary tours was in Scotland 1741. He went on the invitation of Ralph and Ebenezer Erskine, well-known leaders of an earnest evangelical secession from the Church of Scotland; but his notions were too catholic for his friends—he was as ready to preach in a parish church as to a seceding congregation, and more ready still to preach in the open air—and the Erskines soon separated from him. That the impression that he made on the people of Scotland was very strong and very general, may be inferred from the fact that the leading corporations

of Scotland—Edinburgh, Glasgow, Aberdeen, Stirling—admitted him to their citizenship. At Cambuslang, in Lanarkshire—a mining district, inhabited mainly by rude colliers, then *adscripti glebæ*—his preaching produced one of the most remarkable ‘revivals’ of modern times; many thousands were stricken with concern about their souls, and violent physical manifestations followed—foaming at the mouth, bleeding at the nose, convulsions—which, by many who read of them, were attributed to Divine influence, by others to Satan. W., on his return from this visit to Scotland, making a stay in Wales, met and married a widow, a Mrs. James. His marriage, like that of Wesley, was not a happy one.

To America W. paid seven visits, several of which lasted two or three years: his labors were chiefly with the Congl., Presb., and Bapt. churches. He set out for America for the last time 1769. His health had begun to fail, from his excess of labors; and he put himself on what he called ‘short allowance’ in preaching—preaching not more than three times on Sunday, and once on each week-day. It has been stated that ‘in the compass of a single week, and that for years, he spoke in general 40 hours, and in very many 60, and that to thousands.’ He was ailing at the beginning of his last voyage; he was ill at the end of it; and he died somewhat suddenly not long after his arrival in America, at Newburyport, Mass.; and, according to his request, was buried before the pulpit of the Presb. church in that town. His last sermon had been preached the day before, at Exeter, N. H.—A collection of his sermons, letters, and controversial writings was published in the following year (*The Works of the Rev. George Whitefield*, 6 vols. London 1771). His writings do not sustain the impression which would be derived from the accounts of his preaching. They show him as a man of somewhat commonplace quality of mind; without extensive learning; entirely free from the casuistical turn, as well as deficient in the worldly prudence, for which Wesley, like many other enthusiasts, was pre-eminent. His success as a preacher seems to have been due partly, indeed, to a sonorous but expressive voice, which could reach the distant auditors in an assembly of 20,000 people; but mainly to the earnestness of his faith, to the fluency and rude strength of his homely language, and to that vehemence and impetuosity of nature most distinctive of the orator. Undoubted elements in his success were his great tenderness of heart, which made him lovable, combined with his integrity, frankness, and intrepidity. One of many illustrations of his marvellous power was in the case of the cool, equable, and philosophic Benjamin Franklin, who heard him in Philadelphia, and was completely captivated by his eloquence.—Of the *Memoirs of the Life and Character of George Whitefield*, by J. Gillies, D.D., of the College Church, Glasgow (London 1772), editions, containing additional matter, appeared 1798, 1811, 12, 13, and 27. An anonymous *Life of George Whitefield*, founded on his journals and letters, and borrowing largely from the work

WHITEFIELDIANS—WHITEHAVEN.

of Dr. Gillies, appeared at Edinburgh 1826. *Whitefield's Life and Times*, by Robert Philip, D.D., was pub. London 1837; and there has since appeared *George Whitefield: a Light rising in Obscurity*, by Andrews (Lond. 1864); and another full memoir by Tyerman (1876).

WHITEFIELDIANS, n. plu. *hwīt-fēld'ī-anz*: in *chh. hist.*, the followers of George Whitefield (q.v.), who separated from the Wesleys 1741 on the question of personal election, and established the Calvinistic Methodists. Since 1748, when Whitefield became chaplain to the Countess of Huntingdon, the name has fallen into disuse.

WHITEFISH: a fish of the genus *Coregonus* (q.v.), family *Salmonide*. Those members of the genus which are more especially called W. are the Common W. (*C. clupeiformis*), of the Great Lakes and n.; the Menomonee W. (*C. quadrilateralis*), N. H. to Lake Superior and n.; the Sault or Musquaw River W. (*C. Labradoricus*), White Mts. to Labrador and Lake Superior; the Mongrel W. (*C. tullibee*), of the Great Lakes, scarce; and *C. Williamsoni* of the Rocky Mts. All are excellent food-fishes, and similar in color—pale or bluish, with the sides white; and all are variable in characters. To distinguish them accurately, see Jordan's *Manual of the Vertebrates of the Northern U.S.*, and G. Brown Goode's publications.

WHITE FLUX: see FLUX.

WHITE GUNPOWDER: mixture used formerly in blasting, but now little used, because of the danger attending its preparation, and the facility with which it explodes by friction. Its ingredients are chlorate of potash, dried ferrocyanide of potassium, and sugar.

WHITEHALL: post-village in Whitehall tp., Washington co., N. Y.; at the head or s. end of Lake Champlain; 65 m. n.n.e. of Albany, 24 m. w. of Rutland, Vt.; on the Delaware and Hudson Canal Co.'s railroad. It is the n. terminus of the Champlain canal, which connects the lake with the Hudson at Troy. It was founded 1761 by Maj. Philip Skene, and called Skenesborough. It is picturesquely situated at the foot of Skene's Mt. and at the mouths of Wood creek and Pawlet river; and in summer steamboats ply daily between it and other lake-ports. The falls in the streams furnish excellent water-power. In 1812 it became a military depot, and has ever since had an important transport trade. Pop. (1890) 4,434; (1900) 4,377.

WHITEHAVEN, *hwīt-hā'vn*: seaport and parliamentary borough of England, in the county of Cumberland; near the point where the Solway Firth joins the Irish Sea; 41 m. s.w. of Carlisle by railway, 304 m. n.w. of London. It contains a market-house, custom-house, baths, and a theatre, the West Cumberland Infirmary, and a free library. The sources of the prosperity of the town are its vicinity to extensive collieries—one of which extends beneath the town and out under the sea for $1\frac{1}{2}$ m.—also the abundance and richness of the hematite iron ore found in the neighborhood. Coal and iron mines are numerous; there are iron-smelting works, and iron and brass found-

WHITEHOUSE—WHITE LADY.

dries—the manufactured iron being shipped mostly to the Welsh and Irish markets. There are dry-docks for building and repair of vessels; and rope-making and the manufacture of thread and sail-cloth are important branches of trade. The harbor is commodious, but becomes nearly dry at low water. It is protected by two stone piers, 965 and 918 ft. long respectively. There entered (1886) 2,377 vessels, of 269,811 tons; cleared, 2,297 vessels, of 257,025 tons.—Pop. (1871) 18,243; (1881) 19,295; (1891) 18,044.

WHITEHOUSE, *hwit'how's*, FREDERICK COPE: archaeologist: b. 1842, Nov. 9; son of Bp. Henry J. W., of Ill. He graduated at Columbia Coll. with high honors, studied in Europe, and was admitted to the bar 1870. He has distinguished himself by original researches, chiefly in regard to the credibility of the Greek historians, the Semitic traditions connected with Joseph, and the topography of Egypt. It was he who discovered the Raiyan depression, identified it as the former Lake Moëris of Ptolemaic maps, and claimed it as the missing factor in Egyptian prosperity. By locating Goshen s. of Memphis, he gave a new explanation to the Hebrew and Arabic traditions. He has published many papers in European languages, including Greek, also in Arabic; has been elected mem. of numerous learned societies, and was made commander of the Osmaniéh by the viceroy of Egypt 1888, for services in Egyptology and a plan for better control of the Nile.

WHITEHOUSE, HENRY JOHN, D.D., D.C.L.: Protestant Episc. bishop of Ill.: 1803, Aug. 19—1874, Aug. 10; b. New York. He graduated at Columbia Coll. 1821, and at the Prot. Episc. Theol. Seminary in New York; ministered in Reading, Penn., 1827–30; in Rochester, N. Y., 1830–44; and in St. Thomas's Church, New York, 1844–51. Elected asst. bp. of Ill., he succeeded Bp. Chase in that diocese 1852. He was present at the Pan-Anglican Conference in Lambeth Palace 1867, and gave the opening sermon. As a man of learning and an eloquent speaker, he had much influence in church assemblies abroad as well as in this country. He was an able upholder of high-church principles. It is said that he was the first advocate in the United States of the adoption of the cathedral system. He received his degree D.D. from Oxford, and LL.D. from Cambridge (England) and from Columbia College.

WHITE LADY: a woman who, according to popular legend, appears in many of the castles of German princes and nobles, by night as well as by day, when any important event, joyful or sad—but particularly the death of any member of the family—is imminent. She is regarded as the ancestress of the race, shows herself always in snow-white garments, carries a bunch of keys at her side, and sometimes rocks and watches over the children at night when their nurses sleep. The earliest recorded appearance of the W. L. was in the 15th c., and is known as the apparition of Bertha of Rosenberg (in Bohemia). The W. L. of other princely castles was identified with Bertha, and the identity was accounted for by the intermarriages of other

WHITELOCKE.

princely houses with members of the house of Rosenberg, in whose train the W. L. passed into their castles. In the castle of Berlin she is said to have been seen 1628, and again 1840 and 1850. The most celebrated in Great Britain is the W. L. of Avenel, the creation of Sir Walter Scott. It was long a common belief in the Highlands of Scotland that many of the chiefs had some kind spirit to watch over the fortunes of their house. Popular tradition has many well-known legends about white ladies, who generally dwell in forts and mountains as enchanted maidens waiting for deliverance. They delight to appear in warm sunshine to poor shepherds or herd-boys. They are either combing their long hair, or washing themselves, drying wheat, beating flax, or spinning: they also point out treasures and beg for deliverance, offering as reward flowers, corn, or chaff, which gifts turn in the instant into silver and gold. They wear snow-white or half white and half black garments, yellow or green shoes, and a bunch of keys at their side. All these and many other traits that appear in individual legends may be traced back to a goddess of German mythology who influences birth and death and presides over the ordering of the household. Still more distinctly the appellation W. L. and the name Bertha point back to the great goddess of nature, who appears under various names, and who, as *Berhta* or *Berchta* (i.e., the brilliant, shining, white), held her circuit on Twelfth-night and revealed her power. When the legend goes on to say that the Bohemian Bertha of the 15th c. promised the workmen of Neuhaus a sweet soup on the completion of building the castle, and that this soup, with carp, is still given in remembrance of it to the poor on Maundy Thursday, we recognize again the festival dishes consecrated to Berchta (q.v.), such as fish, oatmeal gruel, or dumplings, etc., which it is still customary to eat about the time of Twelfth-night and Christmas in most districts of Germany.

WHITELOCKE, *hwit lok*, BULSTRODE: English statesman and lawyer: 1605, Aug. 2—1676, Jan. 28; b. London; son of Sir James W. (1570–1632) and Elizabeth Bulstrode. He was educated at Merchant Taylors' School, and at St. John's College, Oxford, which he left before taking a degree, to study law at the Middle Temple; 1626 was engaged in a subordinate legal position in the impeachment of the Duke of Buckingham; 1640 was elected to the Long Parliament for Great Marlow; 1640–1, chairman of the committee for conducting the impeachment of Strafford, and outlined the charges against him; 1641–2, parliamentary commissioner to treat with Charles I. at Oxford. He disapproved of and refused to take part in the trial of the king. In 1643 he was a member of the Westminster Assembly of Divines, and opposed the adoption of the Presb. doctrine and discipline; 1644 gov. of Windsor, and as gov. saved the royal library and medals from dispersion; 1653 ambassador to Sweden to negotiate a treaty with Queen Christina; commissioner of the treasury 1655; speaker of the house of commons 1656, and member of the house of lords 1657; commissioner of the great seal to

WHITE MOUNTAINS—WHITE PLAINS.

Richard Cromwell, but helped to depose him; pres. of the council of state during the interregnum. At the restoration his name was included in the Act of Oblivion, but he was left undisturbed at Chilton Park, his Wiltshire seat, where he died. He left valuable MSS., of which *Memoirs of English Affairs from the Beginning of the Reign of Charles I. to the Restoration of Charles II.* was published 1682, new ed. 1732, last ed. 1852.

WHITE MOUNTAINS: mountain chain of N. H., regarded as an outlying range of the Appalachians (q. v.); having its n. extremity at the head-waters of the Aroostook river, Me., where its first summit is Mt. Katahdin; and extending in a broad plateau, 1,600 to 1,800 ft. high, w.-by-s. nearly across N. H., where it has 20 bold peaks, with deep, narrow gorges, wild valleys, beautiful lakes, lofty cascades, and torrents, forming the 'Switzerland of America,' a favorite resort of summer tourists. The peaks cluster in two groups—the eastern or White Mt. group, and the w. or Franconia group—separated by a table-land 10 to 15 m. wide. Mt. Washington (the highest summit of either group, and the highest in the region of the United States n. of N. C. and e. of the Rocky Mts.) is 6,288 ft. high; it has a good carriage-road, and a hotel on its summit. Mt. Jefferson is 5,794 ft., Mt. Adams 5,714, Mt. Madison 5,365 and Mt. Monroe 5,384 ft. high. These peaks, called the Presidential group, are the principal, though there are many others included in the White Mts. Of the Franconia Mts., Mt. Lafayette, 5,290 ft. high, is the only one that exceeds 5,000 ft. The W. M., with an entire area of more than 800 sq. m., furnish the chief sources of the Connecticut, Merrimac, and Androscoggin rivers. The rocks are ancient metamorphic, with naked granite and gneiss. The Ammonoosuc river falls 5,000 ft. in 30 m., the Androscoggin 200 ft. in a mile. Five narrow and precipitous notches seem to have been rent in the mountains, and give passage to as many rivers.

WHITE PLAINS, BATTLE OF: a contest in the American revolution, 1776, Oct. 28—Howe commanding the British, Washington the Americans. Washington, anticipating Howe's attack on White Plains, marched his troops up the w. bank of the Bronx river, and established his headquarters there. Howe, who had been reinforced, took a position at Scarsdale Oct. 25, his right about 4 m. from White Plains. Several skirmishes having taken place in the mean time, on the morning of the 28th Howe moved forward with 13,000 men; but Washington having a strong position and a somewhat larger number of men, Howe was not desirous to attack him, and instead sent a force of 4,000 to carry Chatterton Hill, w. of the Bronx, held by 1,600 Americans under McDougall. This movement was successful; McDougall's militia, after a show of resistance, fled, but Haslett's and Smallwood's regiments, which had distinguished themselves at Long Island, made a brave stand, and were again and again repulsed before superior numbers forced them to retreat across the bridge to the camp. The American loss was nearly 200 men.

WHITE PRECIPITATE—WHITETHROAT.

Howe now decided to await further reinforcements before attacking Washington; but the latter, on the 31st, withdrew his army to a stronger position above White Plains; and Howe, Nov. 5, broke camp and moved to Dobbs Ferry.—WHITE PLAINS is the county-seat of Westchester co., N. Y., 25 m. n.e. of the city hall of New York, on the N. Y. Central and Hudson River railroad. In this town occurred the first public reading in New York colony of the Declaration of Independence, 1776, commemorated by a celebration 1892, July 9.—Pop. (1890) 4,042.

WHITE PRECIPITATE: see MERCURY.

WHITE RIBBON GOSPEL ARMY: in *chh. hist.*, a religious sect or Christian soc. giving special attention to moral purity. They first registered places of worship in England 1884.

WHITE SEA (Russ. *Bjeløje-More*): arm, great bay, or inlet, of the Arctic Ocean, penetrating the Russian govt. of Archangel as far s. as lat. 64° n. At its entrance between Cape Kanin, at the extremity of the Kanin peninsula, and Cape Sviatoi, on the n. shore of the Kola peninsula, it is 100 m. broad; after penetrating the land 150 m. in a s.e. direction, it narrows to 35 m.; but after sweeping s. for 200 m., it again considerably widens, forming in the n.w. the Gulf of Kandalaska, and in the s. and s.e. the great Gulfs of Onega and Archangel or Dwina; total area 47,000 sq. m. (estimated); coast-line more than 1,000 m. The coasts in the n. and e. are mountainous, in other places mostly low, abounding in lakes, which communicate with the sea by rivers. The greatest depth of the W. S. is 1,133 ft. From the middle of Aug. ice forms on the coasts, sometimes to the width of 30 m., and is not melted till the following July.

WHITE SULPHUR SPRINGS: watering-place in W. Va.; on Howard's creek; 225 m. w. of Richmond, 2,000 ft. above sea-level. It has hotel accommodation for 1,500 guests. The spring is in the lowest part of a beautiful valley, and is covered by a dome supported by 12 Ionic columns and surmounted by a statue of Hygeia: it yields 30 gallons per minute of water at 62° Fahr., impregnated with sulphates of lime, soda, magnesia, carbonate of lime, chlorides of calcium and sodium, iron, iodine, sulphur, carbonic acid, sulphuretted hydrogen, oxygen, nitrogen. It is considered efficacious in dyspepsia, liver diseases, gout, rheumatism, and diseases of the skin and kidneys. The Red, Salt, and Blue Sulphur Springs, 22 to 24 m. distant, also are favorite resorts.

WHITE THROAT (*Curruca cinerea*): bird of the family *Sylviadæ*, a visitant during summer in England and Ireland, but comparatively rare in Scotland. It is common during summer in s. and middle Europe, and is found even in the n. It places its nest in a low bush or among a tangled mass of brambles and weeds. Its food consists of insects and berries. Its song is not very sweet, but is delivered with great energy; and it seems to

WHITEWATER—WHITGIFT.

vie with other birds in singing, refusing to be outdone. It is very lively and amusing as a cage-bird, and very easily tamed. The length of the W. is $5\frac{1}{2}$ in. Its plumage is brown, of various shades; breast and belly brownish white, tinged with rose-color in the male.—The Lesser W. (*Curruca sylvia*) is a species much rarer in Britain. The Whitethroats belong to the same genus as the Blackcap (q.v.), and as the Garden Warbler (*C. hortensis*), which almost rivals the Blackcap in the richness of its notes.

WHITEWATER: city in Walworth co., Wis.; on the Chicago Milwaukee and St. Paul railroad; 45 m. e.s.e. of Madison, 51 m. w. s.w. of Milwaukee. It is in an agricultural region, and has important manufactures, including cheese, agricultural implements, paper, furniture, wagons, and sash and doors. Considerable stock-raising is carried on in the vicinity. W. contains 10 churches, State Normal School, Collegiate Institute, 1 national bank (cap. \$100,000), and 1 daily and 2 weekly newspapers. Pop. (1880) 3,617; (1890) 4,359; (1900) 3,405.

WHITE-WOOD BARK: see CANELLA.

WHITFIELD, *hwit'fēld*, HENRY: clergyman: 1597-1658; b. England. He received a university education, and as his father had destined him for his own profession, the law, he was entered at the Inns of Court, but, following his own preference, he took holy orders and became minister at Ockley, Surrey. He was a friend and protector from persecution of the Nonconformists, and after 20 years in the Established Church publicly joined them, and was himself persecuted for refusing to read the *Book of Lawful Sunday Sports*. In 1637, with Gen. Theophilus Eaton and many of his former church, W. came to this country, purchased from the Indians the site of Guilford, Conn., and began a settlement there; he also aided in the founding of the New Haven colony. He devoted the large fortune which he inherited to charitable and public uses. In 1650 he returned to England and became minister at Winchester, where he died. He was author of a number of religious works.

WHITGIFT, *hwit'gift*, JOHN, D.D.: third Prot. abp. of Canterbury: 1530 (or 33)—1604, Feb. 29; b. Great Grimsby, Lincolnshire; son of a merchant, of a family long established in Yorkshire. His early years were passed within the Abbey of Wellow, near Grimsby, of which his uncle was abbot; and from that he went to St. Anthony's School in London, a religious house then in great reputation. About 1548 he was entered at Queen's College, Cambridge. After a short time he removed to Pembroke Hall, of which he continued a member till 1555, when he was elected a fellow of Peterhouse. He took orders 1560; and as he showed remarkable talent for preaching, the bp. of Ely appointed him his chaplain and gave him the living of Feversham. In 1563 he was appointed Lady Margaret prof. of divinity, in which office his lectures gave great satisfaction. In 1567 he became master of Pembroke Hall; and in the same year Queen Elizabeth, who admired his

preaching and had made him one of her chaplains, appointed him master of Trinity College. About this time he obtained also the regius professorship of divinity and took his doctor's degree. He was appointed dean of Lincoln 1571, bp. of Worcester 1577, and abp. of Canterbury 1583. He at one time held simultaneously—under a dispensation from the abp.—the deanery of Lincoln, the mastership of Trinity, the regius professorship of divinity, and the living of Feversham; and the dispensation enabled him to hold with these any other benefice whatever. This cannot have been often paralleled, even in the history of pluralities. Of course the man so favored had rendered, and was using his abilities in rendering, considerable services to the church and to the crown.

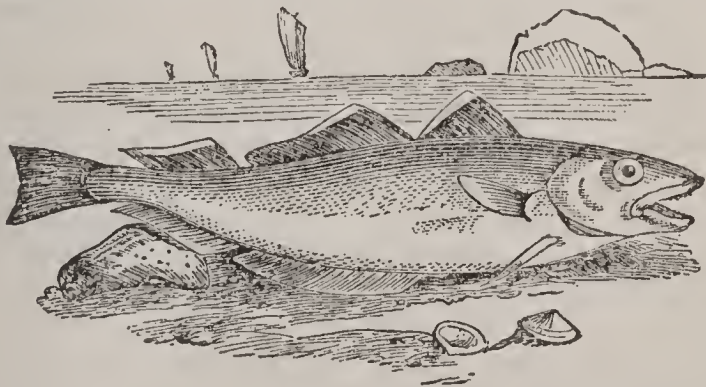
His first work, on becoming master of Trinity, was on a revisal of the statutes of the university. He obtained such powers for the heads of houses as afterward enabled them to eject from the Lady Margaret professorship the able and energetic Puritan, Cartwright, because of his Calvinistic creed. He had a pulpit controversy with Cartwright, in which, whether W.'s arguments were or were not as effective as Cartwright's, W. had at least the advantage of a position in which he was able to enforce them with arbitrary authority: Cartwright was deprived of his professorship 1570; and W. deprived him of his fellowship in the univ. 1571. W. afterward (1572), at the request of Abp. Parker, published an answer to an 'Admonition of Parliament' (drawn up by a clergyman named Field) presented to the house of commons on behalf of the Puritans, in which was maintained their view that, in matters of doctrine and discipline, the church should admit nothing as authoritative but what was contained in Holy Scripture. It has always been held by those of high-church views that, in this reply, W. vindicated the position of the Anglican Church against the Puritans with no less ability than Bp. Jewell showed in defending it against the Romanists. He was answered by Cartwright on behalf of the Puritans; he replied, and Cartwright rejoined; and as the works on either side were revised by the most learned and eminent men of the two parties, they give an excellent view of the state of opinions in the Anglican Church at this time. After becoming primate, W. labored assiduously to secure uniformity of discipline in the church. He had the full confidence of Queen Elizabeth, who placed all the church patronage of the crown, including the bishoprics, in his disposal; and he was armed with full powers for carrying out his design, which was hers also. He required the clergy not only to subscribe to the royal supremacy, the liturgy, and the thirty-nine articles of the church, but also to a set of additional articles framed mainly with the view of purging the church of Puritanism. The bishops were required to administer those tests; and the clergymen who refused to accept them were deprived of their livings. This measure was harshly conceived; yet W. is said to have been a kindly man: doubtless in his severe policy against the Puritans he gave extreme application of his

WHITHER—WHITING.

own views in obedience to the behests of his strenuous sovereign, who would brook no dissent. He was made a privy councilor in 1586, and in that capacity drew up a set of statutes for cathedral churches, to make their services conform to the principles of the Reformation. He was offered the chancellorship by Queen Elizabeth, but declined the office. In 1593 W. procured the passing of an act making Puritanism an offense against the statute-law of the realm. On the accession of King James he seems to have been alarmed for the stability of the system which he had spent his life in rearing; and though the monarch treated him with great observance, anxiety on this account is said to have hastened his death by paralysis. He is undoubtedly entitled to rank with the ablest and most distinguished prelates of the English Church. Abp. W. was very hospitable: he was also stately in his style of living—sometimes making his visits to large towns with a retinue of 800 horsemen. He founded a magnificent hospital and a grammar school at Croydon.

WHITHER, ad. *hwīth'ēr* [OE. *whider*; AS. *hwider*, *whither*]: to what or which place. **WHITHERSOEV'ER**, ad. *-sō-ēv'ēr*, to whatever place.

WHITING, *hwī'ting*: fish of the genus *Menticirrhus* and family *Scienidae*. The W. of Md. to Brazil (*M. Americanus*), with outer teeth of the upper jaw very strong, is silvery gray, with faint oblique bars. The Silver or Surf W. of Va. to Texas (*M. littoralis*) is silvery gray, with the tip of the caudal fin black. These belong to a family with ctenoid (comb-like) scales. North of Va. and in England the name W. is given to species in the Cod family (*Gadidae*)



Whiting (*Merlangus vulgaris*).

with cycloid scales. The W. otherwise known as Silver Hake or Stock-fish (*Merluccius bilinearis*). Va. and n., is 2 ft. long, the top of the head with W-shaped ridges, and the angle of the mouth black. This species and the European whittings (genus *Merlangus*) differ from the cod, haddock, and their congeners (*Gadus* or *Morrhua*) in having no barbule on the lower jaw. The Common W. (*Merlangus vulgaris*) is abundant on many parts of the Brit. coast. It sometimes (and not rarely) attains a weight of 3 or 4 lbs., and a W. of 7 lbs. has been taken. The color is dusky yellow on the back, sides paler, belly silver

WHITING—WHITMAN.

white; there is a black spot on the upper part of the root of the pectoral fin. It is in high esteem for the table. The flesh is of pearly whiteness, whence the English name. Great numbers of small whittings are sent to market, salted, and dried, under various names. Another species of W., Couch's W. (*Merlangus albus*), is abundant in the Mediterranean. The Coal-fish (q.v.) and the Pollack (q.v.) also belong to the genus *Merlangus*.

WHIT'ING: impure carbonate of lime, prepared by grinding and then washing chalk, so as to separate the coarser particles from the finer, which are collected in masses and dried. It is extensively used for size-painting, and for cleaning plate, etc.; and, on emergency, may be employed as an antidote (in suspension in milk) in cases of poisoning with oxalic or one of the mineral acids.

WHIT'ING, WHITE'NING: see WHITE.

WHITLOW, n. *hwit'lo* [prov. Eng. *whickflaw*—from prov. Eng. *whick*, quick, alive, and Eng. *flaw* (see QUICK and FLAW)]: a flaw or sore about the quick of the nail; paronychia; also a name applied to a disease in the feet of sheep.—*Whitlow*, in the human subject, is a painful inflammatory affection of the phalanges of the fingers, almost always proceeding to suppuration. There are several varieties, according to the texture primarily attacked; thus, W. may be situated in the skin, in the cellular (or connective) tissue beneath the skin or under the nail, in the tendons or tendinous sheaths running along the fingers, or in the periosteum. If in the skin, vesicles appear, which soon discharge pus, after which relief is rapidly afforded. Such cases require little care or attention, and give rise to hardly any constitutional disturbance. If the cellular tissue is the primary seat of inflammation, there is a painful sensation of tenseness and throbbing of the part, and often considerable febrile disturbance, until the pus can be evacuated. Though this form is painful, no serious trouble is to be apprehended. When, however, the tendons and their sheaths, or the periosteum, are affected, a much more serious form of W. is developed, for which see TENDON: in this form the suppuration may extend up the arm and occasion destruction of the joints, and even death.

W. may originate either spontaneously, or after an external injury, such as a prick from a needle, thorn, etc. In treatment of the milder forms, the finger or thumb should be held for half an hour or longer in water as hot as can be borne, and then rubbed with lunar caustic. When matter shows itself, an incision should be made, to permit its escape. Even if suppuration has not taken place, a free incision into the inflamed part often gives great relief.

WHITMAN, *hwit'man*: town in Plymouth co., Mass.; 21 m. from Boston, on Old Colony railroad; formerly South Abington. Boots, shoes, and eyelets are manufactured, and two papers are published. Pop. (1900) 6,155.

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WHITMAN, MARCUS, M.D.: early missionary in Oregon: 1802, Sep. 4—1847, Nov. 29; b. Rushville, N. Y. He graduated at Berkshire (Mass.) Med. Institute. While practicing medicine in Wheeler, N. Y., he was enlisted by the Rev. Samuel Parker to accompany him as missionary of the Amer. Board to Oregon 1834-5. Returning for reinforcements, he made the famous first journey with a wagon to Or. 1836, his wife and Mrs. H. H. Spaulding being of the party. His mission was established at Waiilatpu. Finding that the Hudson's Bay Company were moving to occupy Or. with emigrants from Manitoba, he made a perilous journey on horseback over the mountains, in winter, to Washington, to warn our government against yielding to Great Britain that region, then largely believed to be both worthless and inaccessible. On his way eastward, he stimulated emigration from the border states: see OREGON. After 11 years of useful work, he, with many others at the mission, was murdered by Indians. A monument to him, and a county, town, and college at Walla Walla, named for him, show the appreciation of this hero in the great state which he saved to the American Union.

WHITMAN, WALT: poet: 1819, May 31—1892 Mar. 26; b. West Hills, Long Island, N. Y. He studied in the public schools of Brooklyn and New York; at 16 years taught school, in the summer seasons learning the printer's trade; first contributed prose to the Brooklyn *Patriot* and poetry in the usual style to the New York *Mirror*; in 1839 founded *The Long Islander* at Huntington, L. I.; for two years edited *The Brooklyn Eagle*; contributed to the *Democratic Review*, and worked with the party which it represented, but in 1848 joined the 'free-soilers.' After travelling s. and w., he returned to Brooklyn, assisted his father in carpentry, and published *Leaves of Grass* 1855. In this volume, as in his longshoreman style of dress at the time, he discarded all conventionalities, and he indulged himself in chaotic literary form and what is commonly regarded as immodest speech. Emerson welcomed it in extravagant words, followed later by expressive silence. In time, the book and other deliverances came to be widely admired in this country and England by those who welcome anything bizarre. Whitman was personally of a noble nature, and certainly had a true vein of poetry and a large way of looking at life and American civilization, but preferred the shovel to the chisel as an instrument of art. His humane service as volunteer nurse in the war, 1862-65, led to ill-health, and to paralysis in 1873. He died in Camden, N. J. His publications include: *Drum-taps* (1865); *Memoranda during the War* (1867); *Democratic Vistas* (1870); *Passage to India* (1870); *Specimen Days and Collect* (1883); *November Boughs* (1885); *Sands at Seventy* (1888); and *Good-bye, My Fancy* (1891).

WHITNEY.

WHITNEY, *hwit'ni*, ADELINE DUTTON (TRAIN): author: b. Boston, 1824, Sep. 15; daughter of Enoch Train, founder of the Warren line of packet-ships between Boston and Liverpool. She was educated in Boston. She has contributed largely to periodicals, especially for children; has published several volumes of poems and many novels. Among her stories are: *Mother Goose for Grown Folks* (1860); *Faith Gartney's Girlhood* (1863); *A Summer in Leslie Goldthwaite's Life* (1866); *Patience Strong's Outings* (1868); *We Girls* (1870); *The Other Girls* (1873); *Odd or Even* (1880); *Bonnyborough* (1885); *Ascutney Street* (1890); and *A Golden Gossip* (1891). Mrs. W. is skilful with the brush as well as with the pen, and when in Europe made some fine copies in water-colors of paintings of the old masters, and she has painted much of the New England flora. She lives at Milton, Mass.

WHITNEY, ELI: inventor of the cotton-gin: 1765, Dec. 8—1825, Jan. 8; b. Westborough, Mass. His mechanical skill, together with school-teaching, enabled him to support himself in Yale Coll., graduating 1792. With the expectation of teaching, he went to Georgia; but began the study of law, the widow of Gen. Nathanael Greene having invited him to become an inmate of her household. She soon perceived his mechanical genius, and directed his attention to the need of some device to separate cotton-seed from the fibre, a pound a day being all that was cleaned by the ordinary plantation-hand. He set himself to work, making his own tools, and even manufacturing the wire needed, and within the year of his arrival, 1792, turned out a machine substantially the same as the improved ones now in use. It consisted of circular iron combs set thickly around a revolving cylinder, and playing into a finely grated rack containing the cotton; the seed was thus detained in the rack, and the gathered fibre pulled through was separated from the cylinder combs by a revolving set of brushes, while a fan also drove into a receptacle any loose fibres. It enabled one laborer to clean 200 times the amount of cotton that could be prepared by his hands alone. It was sought to keep the invention secret until a patent was obtained, but the machine was stolen and copied—some copies having toothed plates in place of the wire combs. Whitney maintained his claim in a multitude of lawsuits for infringement of patent, and the expense of these, the burning of a cotton-gin factory which he and Phineas Miller had established in Conn., the false reports that the gin cut the cotton fibre, and the influence of southern congressmen against renewal of the patent, left the inventor without any reward except a royalty for five years from N. C., and a bonus of \$50,000 from S. C., which was collected only with much expense and delay. A royalty was promised by Tenn., but afterward repudiated. In 11 years following the invention the export of cotton from the United States had increased 21½ times. Macaulay said that W.'s invention did more for the power and progress of the United States than Peter the Great did for those of Russia. With little left of the

WHITNEY.

gains he should have received, Whitney began the manufacture of firearms 1798, and founded what is now Whitneyville, named from him, near New Haven. He devised his own machinery and tools, and was a pioneer in the system of division of labor in this manufacture, and in making the parts of a musket of a fixed pattern and size, so as to be replaceable. He received repeated contracts from government, which brought him a fortune and promoted the defensive independence of the nation. He married a daughter of Judge Pierpont Edwards 1817. He died in New Haven. To Yale he left a fund for purchase of books on mechanics and physics.—A memoir of him was published by Prof. Denison Olmsted, of Yale College, 1846.

WHITNEY, JOSIAH DWIGHT, LL.D.: geologist: b. Northampton, Mass., 1819, Nov. 23. He graduated at Yale 1839; studied chemistry with Dr. Hare in Philadelphia; was asst. geologist in the N. H. survey 1840-42; studied geol. and related sciences in Europe 1842-47; was at first asst. and then chief geologist in the survey of the Lake Superior district; visited other mining regions; was state chemist and prof. in the State Univ. of Iowa from 1855, and with Prof. Hall made a geol. survey of that state; and was state geologist of Cal. 1860-74. After 1865 he was prof. of geol. in Harvard, and superintendent of the school of mining. Besides his co-authorship with John W. Foster in reports on the geol. of Lake Superior, and with Prof. James Hall on that of Iowa, he published a translation of Berzelius's *Use of the Blowpipe* (1845); *The Metallic Wealth of the United States* (1854); *Geological Survey of California*, 6 vols. (1864-70); *The Yosemite Guide Book* (1869); *Barometric Hypsometry* (1874); *California Botany*, vol. I. (1877); *Contributions to American Geol.* (1880); *Names of Places, or Studies in Geographical and Topographical Nomenclature* (1888). He d. 1896, Aug. 18.

WHITNEY, MOUNT: highest mountain in the United States outside of Alaska; in the Sierra Nevada of s. Cal., in an arid and imperfectly explored region. It is 14,890 ft. high, and has been found very serviceable for meteorological and physical observations, at a height of 13,000 feet.

WHITNEY, WILLIAM COLLINS, LL.D.: sec. of the navy under Pres. Cleveland: b. Conway, Mass., 1841, July 15. His father was in official life as collector of revenue in Boston, and as supt. of the Springfield armory. The son graduated at Yale 1863, studied law at Harvard and in New York, where he has since practiced his profession. He was counselor for prominent insurance companies, and corporation counsel 1875-6 and 1880-82, and did much to ward off fraudulent claims, having previously opposed the Tweed régime. He was an active supporter of Samuel J. Tilden. Appointed sec. of the navy 1885, in Pres. Cleveland's cabinet, he rendered most efficient and judicious service in the renewal of the navy. His wife, who d. 1893, Feb. 4, was a daughter of Senator Henry B. Payne.

WHITNEY—WHITSTABLE.

WHITNEY, WILLIAM DWIGHT, LL.D.: philologist: b. Northampton, Mass., 1827, Feb. 9; brother of Josiah Dwight W. He graduated at Williams Coll. 1845; pursued linguistic studies while clerk in a bank, and, 1849–50, at Yale, also afterward, for some years, in Germany, where he issued an edition of one of the Vedic hymns. Since 1854 he has been prof. of Sanskrit at Yale, and since 1870 also of comparative philology, attaining great eminence in these departments, and a reputation both American and European, recognized by membership in many learned societies on both sides of the ocean, and by honorary degrees. — Besides his translations and corrected texts of the old Sanskrit writings, and many articles in reviews, transactions, and encyclopedias, he published: *On the Material and Form of Language* (1872); *Darwinism and Language* (1874); three series of *Oriental and Linguistic Studies* (1873–75); *Life and Growth of Language* (1876); *Essentials of English Grammar* (1877); *Logical Consistency in Views of Language* (1880); *Mixture of Language* (1881); *The Study of Hindoo Grammar and of Sanskrit* (1884); *Introductory French Reader* (1891); also French, German, and Sanskrit grammars. He was also contributor or co-editor of dictionaries in several languages, and was the editor-in-chief of the great *Century Dictionary*. D. 1894, June 7, in New Haven.

WHITON, hwít'on, JAMES MORRIS, PH.D.: Congregational minister: b. Boston, 1833, Apr. 11. He graduated at Yale 1853; was at the head of the Hopkins Grammar School in New Haven 1854–64; pastor in Lynn, Mass., 1865–75; principal of Williston Seminary, Easthampton, Mass., 1876–78; pastor of the First Congl. Chh., Newark, N. J., 1879–85, and of the Congl. chh. in Tremont, in the annexed district of New York, 1886–91. His views on endless punishment were by many criticised as unorthodox; but he has fully maintained his place in the denominational fellowship. As writer and preacher, he has comprehensive and accurate thought, and a notably pure, lucid, and vigorous style. Besides school-books, he has published: *Is Eternal Punishment Endless?* (1876); *Essay on the Gospel according to Matthew* (1880); *The Gospel of the Resurrection* (1881); *Early Pupils of the Spirit* (1884); *The Evolution of Revelation* (1885); *The Divine Satisfaction* (1886); *Turning of Thought and Conduct* (1887); and *The Law of Liberty* (1888).

WHITSTABLE, hwít'stā-bl: seaport and watering-place in Kent, England; on the s. shore of the estuary of the Thames; at the mouth of the Swale; 6 m. n.n.w. of Canterbury, with which it is connected by railway, and 62 m. s.s.e. of London. W. is a long, straggling village, noteworthy chiefly for its large artificial oyster-beds, the oysters raised here excelling all others in delicacy of flavor. There are breweries, rope-works, copperas-works, and boat-building yards. Some Roman pottery has been found among the oyster-beds, indicating that probably a Roman station existed here.—Pop. (1871) 4,881; (1881) 4,882; (1891) 6,432.

WHITSUNDAY—WHITTEMORE.

WHITSUNDAY, n. *hwīt'sn-ċā* or *hwīt-sūn'dā* [supposed to be so called because the catechumens in the primitive church who received the rite of baptism on the eve of this festival were clothed in *white* robes: AS. *Wīta Sunnan-Dæg*: AS. *hwīt*, white]: the 7th Sunday after Easter—a festival in commemoration of the descent of the Holy Spirit on the day of Pentecost (q.v.). in *Scot.*, *Whitsunday* as a term-day (regulating the letting of houses, farms, etc.) falls (with some local exceptions) on May 15. WHITSUN, a. *hwīt'sūn*, pert. to or observed at *Whitsuntide*. WHIT'SUN-TIDE, n. *-tīd*, the season of Pentecost. The name 'Whitsuntide' comprehends the entire octave, or the week which follows Pentecost Sunday; but the word is more strictly applied to the Sunday, Monday, and Tuesday of that week. The last two days, till a very recent date, were observed in the Rom. Cath. Church as holidays of strict obligation. Many festive observances were anciently practiced in connection with the Whitsuntide holidays, which in England and other Prot. countries still subsist, having outlived the religious association out of which they originated. WHIT-MONDAY or WHITSUN-MONDAY and -TUESDAY, n. the Monday and Tuesday following Whitsunday—observed in England as holidays. The name *Whitsunday* as applied to the day of Pentecost is difficult to explain in view of the fact that in the Roman Church baptism was administered on the first Sunday after Easter (Low Sunday), which received the name of Alb Sunday (*Dominica in albis*), from the white robes worn by the candidates for baptism. The explanation offered is that inasmuch as baptism by immersion formerly prevailed, the later date of Pentecost would naturally be preferred for the rite in the colder climates of the British Islands and the n. of Europe; hence Pentecost came to be a white (robe) Sunday as well as Low or Alb Sunday.

WHITTEMORE, *hwīt'mōr*. THOMAS, D.D.: Universalist minister: 1800, Jan. 1—1861, Mar. 21; b. Boston. He was an apprentice in leather and brass works; studied theology with the Rev. Hosea Ballou; was pastor of Universalist churches in Milford, Mass., 1821-2, and in Cambridgeport 1821-31; was associate editor of the *Universalist Magazine*, and founder and editor of *The Trumpet* 1828-57. He became pres. of the Vt. and Mass. railroad and of a Cambridge bank; and served a number of terms in the legislature. He died in Cambridge.—His chief publications were: *Modern Hist. of Universalism* (1830, enlarged 1860); *Notes and Illustrations of the Parables* (1832); *Songs of Zion* (1836); *Commentary on the Revelation of St. John* (1838); *A Plain Guide to Universalism* (1839); *The Gospel Harmonist* (1841); *Conference Hymns* (1842); *Life of Walter Balfour* (1853); *Life of Rev. Hosea Ballou* (4 vols. 1854-5); and *Autobiography* (1859).

WHITTIER.

WHITTIER, *whīt-ī-ér*, JOHN GREENLEAF: 1807, Dec. 17–1892, Sept. 7, b. Haverhill, Mass: poet: he was reared in the faith, the garb, and speech of the Friends, known as Quakers; and has always maintained their peculiarities of belief and practice, though he has not confined himself to the traditional drab raiment. His first ancestor who adopted the faith was son of one of the early Puritan settlers. W.'s father was a farmer; the son thus had experience of the country life and scenes depicted vividly in some of his poems. He also learned the winter occupation of home-shoemaking, common among farmers of the n.e. states in the first part of the 19th c. For education beyond the district school, he was indebted to the library of Dr. Elias Weld, of his native town; and, at the age of 20, to six months' tuition in the academy there. He had already, the year previous, begun to contribute verse anonymously to the *Free Press* of Newburyport, edited by William Lloyd Garrison, who encouraged the young writer. Soon he contributed to other periodicals, including the *New England Magazine*, and in his 22d year for a while edited the *American Manufacturer* in Boston, returning the next year to Haverhill to edit the *Gazette*, and, after six months, the *New England Weekly Review*, in Hartford, Conn. Two years later ill health brought him home, and 1835 he served a term in the legislature. He was sec. of the Amer. Anti-slavery Soc. 1836–7, and was editor of the *Pennsylvania Freeman* 1838–9, in Philadelphia, where he calmly faced a mob that destroyed his printing-office. Following this he settled in Amesbury, Mass., where he has since resided, spending his winters of late years in Danvers. For 12 years from 1847 he contributed editorially to the *National Era*, a paper established in Washington by Dr. Gamaliel Bailey to advocate the cause of freedom in connection with a high standard of literary merit. His anti-slavery writings, both in prose and verse, had the fire of the denunciatory Hebrew psalms, and the tone of a clarion; but he would gladly have seen a peaceful solution of the problem, and, after the war, was disposed to friendly concessions, like others of the old warriors of abolition agitation. He was never married, his sister Elizabeth, a poetess (d. 1864), having been his housekeeper for many years, and, after her death, his niece.

W.'s poetry is natural, free, yet carefully elaborated. It was widely quoted for its bold and ringing 'voices of freedom,' and has had and still has a great popularity for its frequent tender sentiment, home scenes and scenery, happily embodied native legends, and devout yet liberal religious tone, with occasional quiet humor. Among the poems most familiar to readers are 'Snow-Bound,' 'Maud Muller,' 'Barbara Frietchie,' and 'Skipper Ireson's Ride.' He is a poet of America, both of its past and present. In harmony with his poetry, full of sympathy with humanity and popular in cast, he is simple and kindly, though naturally shy and undemonstrative. In person he is tall, slender, and grave.—His first vol. was in prose and verse, *Legends of New England* (1831). Other prose writings are: *The*

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Stranger in Lowell (1845); *Supernaturalism in New England* (1847); *Leaves from Margaret Smith's Journal*, 1678-99 (1849); *Old Portraits and Modern Sketches* (1850); *Literary Recreations and Miscellanies* (1854); collected *Prose Works*, 2 vols. (1866); *Child Life in Prose* (1873); and revised *Prose Works* (1888-9). The first complete ed. of his poems was issued, illustrated, in the 'Red Line' series, 1868; another ed., 2 vols. 16mo, 1869; the last ed., 'New Riverside,' vols. I.-IV. (*Poetical Works*) of his entire writings, 1888-9. Some of the many successive small vols. of poetry have been exquisitely illustrated by the best artists. Of his separate publications related to national issues were: *The Voices of Freedom* (1849); *In War Time, and Other Poems* (1863); and *National Lyrics* (1865). These volumes, being lyrical and inspired by the poet's most fervid feeling, are most characteristic of his genius. The first ed. of his poems in England was *Ballads, and Other Poems* (1844), followed by *Poetical Works* (1850). See Underwood's *Biog.* (1875 and 83), and W. S. Kennedy's *John G. Whittier: His Life, Genius, and Writings* (1882).

WHITTINGHAM, *hwit'ing-am*, WILLIAM ROLLINSON, s.r.d.: Protestant Episc. bp. of Md.: 1805, Dec. 2—1879, Oct. 17; b. New York. He was educated by his mother, who, for this purpose, became proficient in languages, including Hebrew, in which she instructed theological students. From the General Theol. Seminary in New York he graduated 1825; was engaged in mission work near Orange, N. J., where he became rector of St. Mark's 1829; was rector of St. Luke's, New York, 1831, and prof. of eccles. hist. in the General Theol. Seminary 1835. In 1840 he was chosen bp. of Md., and his administration, though disturbed by his adherence to the Union cause during the civil war, was prosperous, including the establishment of educational and charitable institutions. His high-church position occasioned some controversies; in 1876 he was 'presented' for permitting a rector to read prayers for the dead. He was a delegate to foreign conferences, including that of the Old Catholics. His literary work was editorial on papers and books, exhibiting much learning; and he was one of four contributors to *Essays and Dissertations in Biblical Literature* (1829).

WHITTINGTON, *hwit'ing-ton*, Sir RICHARD: b. probably not long before 1360; d. 1423, Mar.; son of Sir William de W., of Pauntley, Gloucestershire, England. Having no fortune, he went to London to engage in trade. The well-known tradition recounts that W. left London on account of ill usage, but was induced to return by his interpretation of the friendly sound of Bow Bells; and that he afterward found means of living, and of great success, through the instrumentality of his cat. These stories, current since before the end of the 16th c., cannot be said to have any authentic foundation; yet there is nothing improbable in them. He appears, however, to have apprenticed himself to a mercer, and to have rapidly risen in the world. In 1392 he was a member of the Mercers' Company, and was elected alderman and sheriff of London. In 1397,

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1398, 1406, 1419, he was lord mayor of London; and was elected to parliament 1416. For services to Henry V., he received knighthood. There is no doubt of his diligence and uprightness in business; and his great prosperity was equalled by his liberality.—For an argument in favor of the traditions above noted, see the Rev. Samuel Lysons's *Model Merchant of the Middle Ages* (Lond. 1860): see also Besant and Rice's *Sir Richard Whittington* (Lond. 1881).

WHITTLE, n. *hwit'tl* [AS. *thwitan*, to cut]: in *Scot.* and *prov. Eng.*, a small pocket-knife: V. to cut, pare, or dress with a whittle or pocket-knife; to form, prepare, or reduce by paring; to shape with a pocket-knife. WHITTLING, imp. *hwit'tling*. WHITTLED, pp. *hwit'tld*.

WHITTLE, n. *hwit'tl* [AS. *hwitel*; Icel. *hvitill*, a blanket—from AS. *hwit*; Icel. *hvitr*, white: comp. *blanket* from F. *blanc*, white]: in *OE.* and *prov. Eng.*, a blanket worn over the shoulders.

WHITTLESEY, or WHITTLESEA, *hwit'tl-si*: village and market-town in Cambridgeshire, England; 5 m. e. of Peterborough. Agriculture and brick-making are the chief industries.—*Whittlesea-mere*, formerly a shallow lake, abounding in fish, water-fowl, etc., 4 m. s.w. of W., 2 m. long by 1 m. wide, is now drained and laid out in fen-lands, under cultivation.—Pop. of W. (1881) 3,681; (1891) 3,556.

WHITTREDGE, *hwit'rīj*, WORTHINGTON: artist: b. Springfield, O., 1820, May 22. About 1840 he went to Cincinnati, and began portrait and landscape painting. In 1845 he visited London and Paris, and for three years studied under Andreas Achenbach, at Düsseldorf. He studied also in Holland and Belgium. He was in Rome 1855–59; then returned to the United States, and opened a studio in New York. In 1860 he was elected an assoc. of the National Acad., a full member 1861, and its pres. 1874. Among his paintings, which are principally of American scenery, are: *Twilight on the Shawangunk*; *The Coast of Rhode Island*; *The Ruins of Tusculum*; *The Rocky Mountains from the River Platte*; and *Plains of Colorado*.

WHITWORTH, *hwit'wérth*, Sir JOSEPH, F.R.S., LL.D., D.C.L.: mechanician: 1803, Dec. 21—1887, Jan. 22; b. Stockport, England. In 1833 he engaged in the manufacture of engineers' tools in Manchester, and introduced a uniform system of screw-threads and standard gauges for engineering work. His exhibit of improved planing machines and other tools attracted attention at the London exhibition 1851. He was commissioner to the New York exhibition 1853. In 1854 he began the manufacture of fire-arms, developed the Whitworth rifle, made other improvements in guns, and became a competitor of Sir William G. Armstrong (q. v.) in the manufacture of rifled ordnance (see RIFLED ARMS: SHELL, in Gunnery). In 1868 he established 30 scholarships, of £100 annual value each, to encourage engineering science. He was made a baronet 1869. He published: *Miscellaneous Papers on Mechanical Subjects: Guns and Steel* (1873); and *Plane Metallic Surfaces, and Preparing Them* (1879).

WHITY-BROWN—WHOOF.

WHITY-BROWN, a. *hwî'tî-brown* [*white*, and *brown*]: of a color between white and brown.

WHIZ, v. *hwîz* [imitative of the sound it is intended to represent, as *fizz* or *hiss* (see also **WHEEZE**)]: to make a sharp hissing or humming sound, as an arrow or rifle-ball during flight, or as compressed air escaping; to fizz: N. a hissing sound. **WHIZ'ZING**, imp. **WHIZZED**, pp. *hwîzd*. **WHIZ'ZINGLY**, ad. -*lî*.

WHO, rel. *hō* [AS. *hwá*; Dan. *hvo*; Dut. *wie*; Ger. *wer*; Russ. *kto*; L. *quis*; W. *pwŷ*; Skr. *kas*, who]: a relative or interrogative word which refers to a person; which of many or of all these, as, *who* is the person who has a right to exercise it? used interrogatively. **WHOM**, *hōm*, obj. case of *who*. **WHOSE**, *hōz*, poss. case of *who*; used also instead of 'of which' (referring to things), as, the question *whose* solution is desired. **WHOEV'ER**, rel. -*ēv'ēr*, every one who; whatever person. **WHOSO**, rel. *hō'so*, or **WHO'SOEV'ER**, rel. every one who—**WHOM'SOEV'ER** being the obj. case, and **WHOSE'SOEV'ER** the poss. case.

WHOA, int. *hwō*: stop!

WHOLE, a. *hōl* [Dut. and Dan. *heel*; Icel. *heill*; Sw. *hel*; Ger. *heil*; Goth. *hails*, entire: W. *holl*, all; *hollol*, whole: a doublet of **HALE** 1]: all; entire; unbroken; sound; containing the total amount; not defective; in *OE.*, in good health; hale: N. the total: the entire thing; a regular or systematic combination. **WHOLE'NESS**, n. -*nēs*, entireness: totality. **WHOL'LY**, ad. -*lî*, entirely; completely; in all the parts or kinds. **WHOLE'SALE**, n. -*sāl* [*whole*, and *sale*]: the sale of goods in large quantity to retailers only; the whole mass: ADJ. buying and selling in large quantity only; of or pertaining to such sale; extensive and indiscriminate as *whole-sale* accusations. **WHOLESALE'ERS**, n. plu. -*ērz*, those who sell by wholesale. **BY WHOLESALE**, in the mass; without distinction or discrimination. **WHOLE'SOME**, a. -*sūm* [*whole*, and *some*]: favoring health; salubrious; useful; conducive to happiness or virtue; salutary; in *OE.*, hale; healthy. **WHOLE'SOMELY**, ad. -*lî*. **WHOLE'SOMENESS**, n. -*nēs*, the state or quality of being wholesome or conducive to health. **WHOLE'-LENGTH**, n. a portrait or statue representing the whole person or thing: ADJ. representing the whole figure, said of a picture or statue.—**SYN.** of 'whole, a.': all; every; each; complete; total; integral; perfect; undivided; uninjured; unimpaired; healthy;—of 'whole, n.': gross; amount; totality; aggregate.

WHOM, WHOMSOEV'ER: see under **Who**.

WHOO'BUB, or **WHO'BUB**, n. *hō'būb*: *OE.* for **HUBBUB** (q.v.).

WHOOF, v. *hōp* [imitative of a clear high-pitched cry as is heard in the hooping-cough: F. *houper*, to call afar off]: to utter loud, shrill, and prolonged sounds in pursuit or attack, as in war by savages; to insult with shouts of defiance: N. a shout in pursuit or attack in war or the chase. **WHOOF'ING**, imp. **WHOOPED**, pp. *hōpt*. **WAR-WHOOF**, a battle-cry; the shout of attack. **WHOOPI- or HOOPING-COUGH**: see **HOOPING-COUGH**.

WHOP—WHORTLEBERRY.

WHOP, v. *hwōp* [of imitative origin]: *familiarly*, to beat; to thrash: N. a blow or fall. **WHOP'PING**, imp. **WHOPPED**, pp. *hwōpt*. **WHOP'PER**, n. *-pēr*, one who whops; *familiarly*, a tremendous falsehood.

WHORE, n. *hōr* [Icel. *hóra*; Ger. *hure*; Dan. *hore*; Dut. *hoer*, a whore: comp. Skr. *charu*, agreeable: L. *carus*, dear]: a woman who admits unlawful intercourse of men for money; a prostitute; a harlot: V. to practice prostitution; to corrupt by unlawful intercourse with. **WHORE'DOM**, n. *-dōm*, practice of unlawful intercourse with the opposite sex for hire; fornication; in *Script.*, the desertion of the worship of the true God for that of idols; idolatry. **WHORE'MONGER**, n. *-mūng-gēr*, or **WHORE'MASTER**, n. a lewd man; one who keeps or frequents the society of whores. **WHORISH**, a. *hō'rīsh*, lewd; unchaste. **WHO'RISHLY**, ad. *-lī*. **WHO'RISHNESS**, n. *-nēs*, the practice of lewdness. **WHO'RING**, n. the practice of lewdness; in *Script.*, the worshipping of idols. **WHORESON**, n. *hōr'sūn*, in *OE.*, a bastard: **ADJ.** in *OE.*, bastard; contemptible. *Note.*—**WHORE** may be derived from *hire*, as L. *meretrix*, a whore, is from *merēor*, I earn money.

WHORL, n. *hwērl* or *hwawrl* [O. Dut. *worvel*, a spinning-whirl: connected with **WHIRL** (which see)]: any set of organs or appendages arranged in a circle round an axis, and in, or very nearly in, a plane perpendicular to it; a turn of the spire of a univalve shell; leaves arranged in a regular circumference round a stem; the fly of a spindle. **WHORLED**, a. *hwērl'd*, disposed in or furnished with whorls. **WHORL'ER**, n. *-ēr*, a potter's wooden wheel which gives a rotatory motion to flat vessels. **WHORL'-GRASS**, a water-plant, the *Catabrosa aquatica*, ord. *Graminææ*.

WHORT, n. *hwért*, or **WHORTLE**, n. *hwér'tl* [according to Skeat, from AS. *wyrtil*, a small shrub, dim. of *wyrt*, a wort (see **WORT** 2)]: a shrub and its fruit; the whortleberry.

WHORTLEBERRY, *hwér'tl-bēr'ri* (popularly, **HUCKLEBERRY**): small shrub (or its fruit) of the genera *Vaccinium* and *Gaylussacia*, and nat. order *Ericaceæ*, having a 4-5-toothed calyx, a 4-5-cleft bell-shaped or urceolate corolla, with the limb bent back, 8 or 10 stamens, with two-horned anthers, and a 4-5-celled many-seeded berry; the latter genus 8-10-celled, a single ovule in each cell. In the United States the name is most often applied to the black-berried *G. resinosa*, but for this and other species the names Huckleberry or Blueberry are used most frequently. The species are numerous, natives mostly of northern parts of the world, with evergreen or deciduous, more or less ovate leaves.—The **COMMON W.**, or **BILBERRY** (*V. myrtil-lus*), called in Scotland the *Blaeberry*, is very common in Great Britain and in middle and n. Europe. It is found also in Iceland and in the n. regions of N. America. It varies from a few inches to almost 2 ft. in height, and has ovate deciduous leaves and dark-purple berries: a variety occurs, but rarely, with white berries. The berries are very sweet and agreeable, and are much used for making jelly. A kind of spirituous liquor also is made from

WHOSE—WHOSOEVER.

them in Germany.—The BOG W., or GREAT BILBERRY, or BOG BILBERRY (*V. uliginosum*), is common in n. Europe and Asia, and on the highest hills on both sides of the Canadian border. It is said to cover extensive tracts in Greenland. It grows in marshy situations, and is a taller plant than the Common W. It has deciduous, obovate, entire leaves, and a fruit larger than the Common W., and inferior to it in flavor. The fruit is said to cause giddiness when eaten in large quantity. An intoxicating liquor is made from it in Sweden and in Siberia. The only other Brit. species is the RED W. (*V. vitis Idæa*), often called *Cranberry*, because of the similarity of its acid fruit to the Cranberry (q.v.). It is a native of n. Europe, Asia, and America, and in the United States is called Cowberry; it is found in n. New England and Brit. America. Its fruit is esteemed for preserves, and is used in the same way as the cranberry. Large quantities are sent to s. Europe from the shores of the Gulf of Bothnia. The plant is a pretty dwarf shrub, with obovate evergreen leaves and racemes of flowers.—Many species of *Vaccinium* are in occasional cultivation as ornamental shrubs, and the fruit of most of them is agreeable, though in general it lacks acidity. Their more general cultivation has perhaps been prevented by the prevalent notion that they require a peat soil, but they succeed on other soils also. Most of them are N. American.—The BLACK W., or HUCKLEBERRY (*Gaylussacia resinosa*), is a shrub about 2 ft. high, much branched and erect, with deciduous oval leaves. The berries are of shining black color, and sweet. It is widely diffused from Canada to Georgia. The BLUE TANGLEBERRY or DANGLEBERRY (*Gaylussacia frondosa*) is a rather larger and more spreading shrub, which grows in thickets from New England to Ky. The fruit is sweet and edible.—The BEAN W. (*V. ursinum*, or *Gaylussacia ursina*) is found on the mountains of N. C.; the BOX-LEAVED W. (*Gaylussacia brachycera*) in Penn. and Va. Other species are the Dwarf Huckleberry (*G. dumosa*), in low sandy soil, from Me. s. on the coast; the Dwarf Blueberry (*V. Pennsylvanicum*), Penn. and Ill. and n., the earliest in the market; the Canada Blueberry (*V. Canadense*), Me. to Wis. and n., in damp situations; the Low Blueberry (*V. vacillans*), New England to Va. and n. Ill., pale-leaved, branches yellowish green; and the Common or Swamp Blueberry (*V. corymbosum*), the common blue huckleberry of the latter part of the season. The genus *V.* includes other N. Amer. species, among which are the Deerberry or Squaw Huckleberry, and the cranberries.—Several species are natives of Mexico. *V. arctostaphylos* is a native of the coast of the Black Sea; and *V. padifolium* is a native of Mt. Caucasus and of Madeira, on the loftiest parts of which island it forms impenetrable thickets, growing 6 to 10 ft. high.

WHOSE, rel. *hóz* [see WHO]: the poss. case of the rel. *Who* (q.v.); used also for 'of which.' WHOSE'SOEVER, rel. of whatever person.

WHOSOEVER, rel. *hó'sō-ěv'ēr* [see WHO]: whoever; whatever person.

WHY—WHYMPER.

WHY ad. and int. *hwī* [AS. *hwī*, the instrumental case of *hwa*, who]: for which or for what reason or cause; wherefore; used emphatically, as, 'if you will not, *why* then I'll go;' used as a substantive, meaning the 'reason,' as, 'we examine the *why* of things.'

WHYDAH, *hwīd'ā*, or **WHYD'AW**, or **WHID'AW**: maritime province of Dahomey (q.v.), in Africa; on the Bight of Benin. It is populous and very fertile, and exports palm-oil, gold-dust, ivory, and many slaves.—The town of W. is the principal seaport of Dahomey, a decaying place since the suppression of the slave-trade; about 65 m. s.e. of Abomey, the capital of Dahomey, and about 1½ m. from the sea, close to a lagoon and a swamp, between which and the sea a sandy neck intervenes. Into the lagoon flow several rivers, known to slave-traders. For about two-thirds of the way from W. to Abomey, the road lies through dense forest and across a swamp 8 m. wide.—Pop. about 20,000.

WHYD'AH-BIRD, or **WHYD'AH-FINCH**, or **WID'OW-BIRD**: one of the Weaver-birds (q.v.), of the genus *Vidua*, having long wings and a boat-shaped tail, the two middle feathers of the tail of the males excessively lengthened during the breeding season. The name is derived from the country of Whydah in w. Africa, and 'widow-bird' is a mere corruption of it, which, however, has given to the genus its name *Vidua* [L., widow], regarded as appropriate, because the long tail of the male drops off after the breeding season, also because of the general dark color of the plumage. The species are natives of tropical parts of Africa and s.e. Asia. They are frequently brought to Great Britain as cage-birds, for their plumage and the sweetness of their song. The best-known species (*V. paradisea*) is a small bird, about the size of a canary, with black and brownish-black plumage, with a broad collar of orange-rufous color, and breast of somewhat similar color; two feathers of the tail in the male very broadly webbed in the breeding season, and ending in a hair-like shaft, two feathers very much elongated, sometimes 12 in. in length, and about three-quarters of an inch in breadth.

WHYMPER, *hwīm'pēr*, **EDWARD**: traveller, author, and artist: b. London, 1840, Apr. 27. He was educated at Clarendon House School, and took up the profession of draughting on wood, but turned to a more active life. In 1861 he climbed Mont Pelroux, then considered the highest peak in France, and 1861–65 made a series of adventurous ascents among the Alps, being the first to climb the Matterhorn (1865, July 14), when four of his companions lost their lives. He travelled in Greenland 1867 and 1872, making valuable collections of fossils. On a visit to Ecuador 1879–80 he explored many peaks of the Andes, and gathered a large zoological collection. He was the first to reach the summit of Mt. Chimborazo. He has published: *Swiss Pictures, drawn with Pen and Pencil* (1866); *English Sacred Poetry of the Olden Time; Scrambles amongst the Alps in the Years 1860–69* (1869); and *Travels amongst the Great Andes of the Equator* (1892).

WICHERN—WICHITA.

WICHERN, *vich'èrn*, JOHANN HEINRICH, D.D.: superintendent of the Rauhes Haus (q.v.), near Hamburg, and prominent in the German Home Mission: 1808: Apr. 21—1881, Apr. 7; b. Hamburg. He studied theology at Göttingen and Berlin. He early began to visit the poor and wretched in the courts and lanes of Hamburg; and soon gathered 400 to 500 poor children in a Sunday school, instructed by 40 voluntary male and female teachers. He opened the Rauhes Haus (q.v.) 1833. From about 1840, W. was engaged with similar undertakings in Germany, to which his mother-institution gave rise. The example was soon followed in France on a great scale (Mettray, near Tours); then by England, Holland, and other countries. By his instigation, at the first Prot. ecclesiastical assembly, Wittenberg 1848, a central Home Mission Committee was appointed, to organize and direct exertions on behalf of the poor, the miserable, and the morally and religiously lost. This Home Mission has exerted a wide and beneficial influence on n. Germany. Travelling through Germany, W., as a member of this committee, was able to found all sorts of institutions for education and for care of the sick, of the poor, and of prisoners. In 1851 the Prussian govt. commissioned him to inspect all the houses of correction and prisons; and appointed him to their general supervision 1858. In his *Home Mission of the German Evangelical Church* (Hamburg 1849), he explains his views of Christian charity, and its relation to the ecclesiastical and social questions of the day. He has published his *Fliegende Blätter* (Fugitive Leaves), which contain parts of his discourses at the ecclesiastical diets. W. was a man full of Christian faith, and of great spiritual fervor.

WICHITA, *wich'i-taw*: city, cap. of Sedgwick co., Kan., at the junction of the Big and Little Arkansas rivers; on the Atchison Topeka and Santa Fé, the Chicago Rock Island and Pacific, the Missouri Pacific St. Louis and San Francisco, and 6 other railroads; 160 m. s.w. of Topeka, 228 m. from Kansas City, 400 m. from Omaha, 500 m. from Denver. It is in an agricultural and stock-raising country; has large and important manufacturing interests; and for beauty of location and delightfulness of climate, as well as for its swift advance in population and business, has become known as 'the Princess of the Plains.' In 1902 it had 15 public-school buildings (cost \$225,000); 5,000 school children; 28 churches; Y. M. C. A. building (\$100,000); co. court-house (\$250,000); U. S. custom-house and post-office (\$200,000); Garfield Univ. (Christian), the largest educational building under one roof in the United States, opened 1887, enrolled students 1,000, cost \$250,000; Wichita Univ. (Ref.); Lewis' Acad. (Presb.), opened 1886; Southwestern Business College, opened 1887; Benevolent Home; Orphans' Home; Open-door Home; City Hospital (Prot.) and St. Francis' Hospital (Rom. Cath.); societies for prevention of cruelty to animals and children. 35 hotels; and 12 daily, weekly, and monthly periodicals. W. had exceptional shipping facilities by rail and water; horse and electric street railroads, with 50 m. of track;

WICK.

gas (25 m. of mains) and electric light (20 m. of wire) plants; 64 m. of main, lateral, and storm sewers; 25 m. of water mains, supplied from works on an island in the Big Arkansas river, which are fed by 96 four-in. driven wells, aided by a 5,000,000-gallon high-duty pump. There were 328 manufac. establishments, cap. \$2,108,524, wages in year \$639,271, materials used \$3,060,661, value of products \$4,724,068; 25 wholesale and jobbing houses; 3 nat. banks (cap. \$400,000), 2 state banks (cap. \$560,000), and 1 private bank; bonded debt (1902, July 1) \$551,017; assessed valuations, total \$4,697,075; actual value \$14,091,225; and tax-rate, \$3 on \$100. Pop. (1880) 4,911; (1890) 23,853; (1900) 24,671.

WICK, n. *wik* [Icel. *vik*, a corner]: a corner, as the *wicks* of the mouth.

WICK, n. *wik* [O. Dut. *wiecke*; Dan. *væge*, a wick: Low Ger. *weke*, lint]: soft threads of cotton or other substance loosely twisted or plaited into a string, or woven into a narrow web, for a candle or lamp. WICK'ING, n. *-ing*, material for making wicks.—*Wick*, from its porous nature, draws up the oil by capillary attraction in such quantities as to burn easily. Usually wicks are of cotton; formerly flax, hemp, and rushes were used. For ordinary candles the wick consists of a bundle of cotton threads, parallel with one another; but for wax, spermaceti, paraffin, stearin, etc., wicks are usually of twisted or plaited cotton. Very ingenious contrivances have been applied to the manufacture of candle-wicks, to prevent the necessity of snuffing: see CANDLE.

WICK, *wik*: royal and parliamentary burgh and seaport of Scotland, cap. of Caithness-shire; on both sides and at the mouth of Wick Water, at the head of an inlet called Wick Bay; 16 m. s.s.w. of Duncansby Head, 20 m. e.s.e. of Thurso, 374 m. n. of Edinburgh. Pulteney-town, on the s. side of the river (part of the parliamentary burgh), a settlement of the Brit. Fisheries Soc., laid out 1805, is a flourishing town, managed by improvement commissioners. The bay is about $1\frac{1}{2}$ m. long by $\frac{1}{2}$ m. wide, exposed to frequent storms from e. and n.e. There is an excellent tidal harbor of considerable capacity. W. has a county court-house and prison, 9 churches and chapels, a town-hall, the Pulteney-town Acad., and a chamber of commerce, a fish exchange, and a naval reserve station. There are two weekly newspapers. W. is one of the great centres of the herring-fishing in Scotland. Everything in the town is subservient to the herring-fishery; and the trades—chiefly barrel-making, boat-building, and rope-making—are directly supported by it. A railway connecting W. with the s. was opened 1874. W. is a port of call of the steamers which ply between Granton and Aberdeen and the Orkney and Shetland Islands.—Pop. of parliamentary burgh (1891) 8,464.

WICK—WICKLOW.

WICK, *wik*, or **WICH**, *wich* [AS. *wic*—from L. *vīcus*, a village: in some names the *-wick* or *-wich* is the same as Icel. *vik*, a creek or bay: it is sometimes impossible to identify the termination]: a town; a village: the second element of many place-names, as *Woolwich*, *Greenwich*, *Berwick*, or as one word in *Wick* (a town in the n. of Scotland): also the district in charge of an officer, as *bailiwick*, the jurisdiction of a bailie.

WICKED, a. *wik'əd* [OE. *wikke*, evil—from AS. *wicca*, a wizzard (see also **WITCH**)]: addicted to vice; immoral; sinful: evil in principle or practice; bad or baneful in effect; addicted to mischief; mischievous. **THE WICKED**, n. plu. persons who live in violation of the divine laws. **WICK'EDLY**, ad. *-lī*. **WICK'EDNESS**, n. *-nēs*, corrupt or sinful manners; crime; moral ill; sin.—**SYN.** of 'wicked': bad; evil; naughty; corrupt; vicious; iniquitous; criminal; guilty; unjust; unrighteous; unholy; irreligious; ungodly; profane; atrocious; nefarious; pernicious; abandoned; flagitious; flagrant; profligate; heinous; base; villainous; impious; cursed; baneful.

WICKER, a. *wik'ər* [from root of **WEAK**: Dan. *vögger*, a pliant rod—from *veg*, pliant: Sw. *wika*, to fold; *veck*, a fold]: made of twigs or osiers; covered with twigs or osiers: N. a small, quick-grown, pliable twig; anything made of twigs or osiers. **WICK'ER-WORK**, work composed of osiers or wicker; basket-work. **WICK'ERED**, a. *-ərd*, made of or covered with twigs.

WICKET, n. *wik'ət* [Wall. *wichet*; Norm. *viquet*; F. *guichet*, a little door within a gate: all from Icel. *vikja*, to give way]: a small gate or door; part of a massive or large door for the admission of persons on foot only; the three stumps or rods stuck in the ground, and supporting the bails, against which the ball is directed in the game of cricket. **WICK'ET-KEEPER**, in *cricket*, the keeper or watcher behind the wicket, in front of which the batsman is playing.

WICKING, n. *wik'ing*: in *curling*, an ingenious master-stroke by which a stone is sent in an oblique direction so as to hit the winner's stone and drive it from the *tee*, the former often replacing the latter, and so becoming the winner in turn; also called **INRINGING**.

WICKLIFFITE, or **WICLIFFITE**, n. *wik'lif-īt*: follower of Wickliffe, the Reformer: see **WYCLIFFE**, **JOHN DE**.

WICKLOW, *wik'lō*: maritime county of Ireland, prov. of Leinster; bounded n. by the county of Dublin, e. by the Irish Channel, s. by the county of Wexford, w. and s.w. by the counties of Carlow and Kildare; greatest length 40 m., greatest breadth 33 m.; 781 sq. m., or 500,178 acres—of which 118,000 are under tillage, 249,200 pasture, 19,500 in plantations, 112,300 towns, waste, etc., and 1,090 under water. The coast-line stretches s. about 39 m.; is in many parts precipitous; and, being obstructed by sand-banks is very dangerous for shipping. The surface ascends in some parts abruptly from the sea, and a large portion is mountainous and unproductive. The Wicklow Mts. form

WICKLOW.

rather a group than a range, and on the w. and n.w. side decline less precipitously toward the central plain. The most elevated point is Lugnaquilla, 3,039 ft. above sea-level. Several other peaks approach this elevation, and the glens between the several mountains or groups are exceedingly picturesque, especially Glendalough, Glendalure, Imaal, the Glen of the Downs, and Avoca, the scene of Moore's well-known Irish melody, *The Meeting of the Waters*. Plains of considerable size lie on the e. and s. shore. The lakes, though strikingly beautiful, are few and of small size; and the rivers in W. are little more than mountain streams. The great central group of mountains is a mass of granite, which protrudes through mica and clay slate, to which latter formation the minor elevations generally belong. The granitic protrusion, one of the most remarkable and best defined in the kingdom, falls away on the e. toward the sea, and on the w. toward the great central limestone. The minerals are numerous and varied. In the granite and mica-slate are galena, green and white lead ore, and copper pyrites. From the clay-slate tract are obtained gold (in minute quantity), silver, copper, iron, lead, zinc, tin, tungsten, manganese, arsenic, and antimony. Silver is found in combination with lead, which is raised with great success and profit. The copper mines also are very productive; and of late years the utilization of the sulphur, formerly wasted, has added largely to the profit.

The soil is very various. There are numerous villas, with extensive and highly cultivated parks, especially in the picturesque district between Bray and Wicklow. The county is divided into eight baronies and contains 59 parishes. The principal towns are Wicklow (q.v.) and Arklow.—W. is described by Ptolemy as the territory of the Cauci, and the names of the rivers mentioned by him are still traceable in their modern appellations. At the Eng. invasion (1169), the greater part of the lands of W. were granted to Maurice Fitzgerald, and W. was included by John in the shire of Dublin. Generally speaking, however, the authority of the English in W. was little more than nominal, the territory being under the chief of the O'Byrne. During the rebellion of 1798, W. was the scene of more than one conflict. W. abounds with antiquities of great interest: many tumuli, raths, cromlechs, and other Celtic remains are preserved; and there are many ecclesiastical remains of almost every period of Irish Christian architecture; those of Glendalough, which include a round tower, are especially interesting.—Pop. (1871) 78,697; (1881) 70,386—of whom 58,571 Rom. Catholics; (1891) 81,934.

WICKLOW-WIDGEON.

WICKLOW: seaport of Ireland, cap. of the county of W.; at the mouth of the river Vartrey; lat. $52^{\circ} 58' \text{ n.}$, long. $6^{\circ} 3' \text{ w.}$; 32 m. s.s.e. from Dublin, with which it is connected by railway. It is an assize town—the smallest in Ireland. Though a seaport, the export trade is extremely small, nor are the fisheries of much value. The principal exports are the products of the mining operations and the agricultural produce of the district. The streets are narrow and ill built. It possesses no noticeable public building. —Pop. (1881) 3,391; (1891) 3,273.

WICLIF (or **WICK'LIFFE**), **JOHN**: see **WYCLIFFE**, **JOHN DE**.

WICOPY, *wik'ō-pī*: the Leatherwood (q.v.).

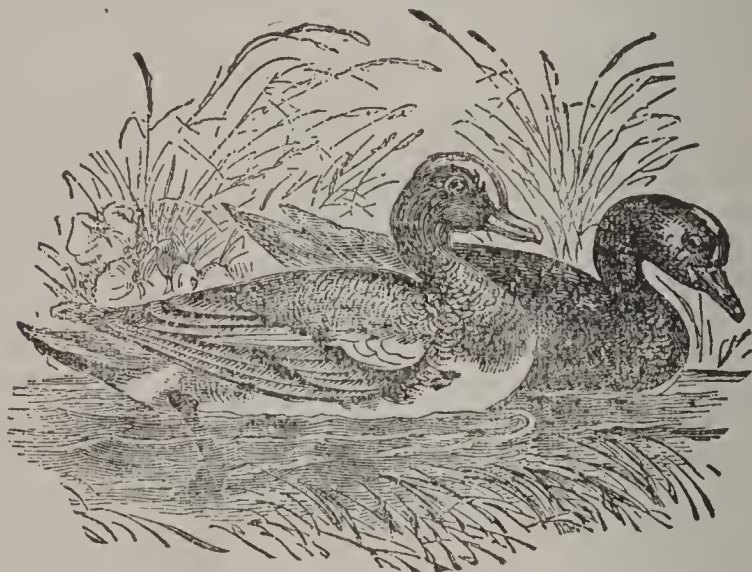
WIDDIN, or **VIDIN**, *vid'in*: town of Bulgaria; on the right bank of the Danube; 140 m. from Belgrade. For centuries W. has been a strong post in all the contests between the Turks and their n. neighbors; and it was called by the Turks the Virgin Fort, from its never having been taken. W. has thriving industries and trade. The Berlin Congress of 1878, which erected Bulgaria into a principality, determined that the extensive fortifications of W. and other Bulgarian fortresses should be demolished. During the Servo-Bulgarian war 1886-7, W. successfully resisted the assaults of the Servians.—Pop. (1888) 14,772.

WIDE, a. *wīd* [AS. *wīd*; Dut. *wijd*; Dan. *vid*; Ger. *weit*; Icel. *widr*, broad, ample]: having a relatively great distance or extent between the sides; opposite of *narrow*; broad; large; broad to a certain degree, as 16 feet *wide*; remote; distant; extensive: AD. at a distance; in *compound words*, far; with great extent, as, 'the gates *wide* open stood:'. N. in *cricket*, a ball flying *wide* or at a distance from the wicket. **WIDE'LY**, ad. *-lī*, in a wide manner or degree. **WIDE'NESS**, n. *-nēs*, quality of being wide. **WIDEN**, v. *wīd'n*, to extend between the sides; to enlarge. **WIDENING**, imp. *wīd'nīng*. **WIDENED**, pp. *wīd'nd*. **WIDTH**, n. *wīdth*, breadth; extent from side to side. **WIDE-AWAKE'**, n. a low-crowned felt hat: ADJ. thoroughly alive or on the watch; alert; keen. **WIDE GAUGE**: see **BROAD GAUGE** (under **BROAD**).

WIDGEON, or **WIGEON**, n. *wīj'ūn* [F. *vigeon*, *vingeon*]: a non-oceanic duck of the genus *Anas*, with the hind-toe not webbed, having the bill shorter than the head and of equal width throughout, much rounded at the tip, with broad strong nail; lamellæ of the upper mandible prominent; wings long and pointed; tail wedge-shaped. The widgeons are migratory, appearing in great flocks in the warmer countries which they visit during the winter. The **COMMON W.** (*Anas penelope*) is plentiful in n. Europe during winter, but rare in America. This species is found at some season of the year in almost all parts of Europe, and in Asia as far s. as n. India; and it is known as one of the birds of Japan. Its length is about 18 in. The forehead and top of the head in the male are white; cheeks and hind-part of the neck reddish chestnut; upper parts grayish white, crossed with irregular zigzag lines of black:

WIDOW.

tail nearly black; wing-coverts white, tipped with black; primaries dark brown; a green speculum edged with black; throat pale rufous; breast and belly white. The female is very different: head and neck rufous brown, speckled with dark brown; back varied with two shades of brown, darker in the centre, and paler in the edges of the feathers. The note of the W. is a shrill whistle, whence its French name *Siffleur*, and the English names *Whew Duck* and *Whewer*. Its flesh is good for the table.—The AMERICAN W., or BALD-PATE (*Anas Americana*), is larger than the



Widgeon, Male and Female (*Anas penelope*).

European W., being about 20 in. long. The upper parts are finely waved transversely with black and reddish brown, under parts mostly white; head and neck of the male grayish, speckled with dusky; top of the head white, and its sides with a bright green patch; wing-coverts white, the greater tipped with black; the speculum green, preceded by black, white, and gray. The female has duller colors. It breeds chiefly in n. parts of America, and is common in winter on the coasts of the United States and in the rice-grounds. Its flesh is highly esteemed. It is a very rare visitant in the Brit. Islands.

WIDOW, n. *wid'z* [AS. *wuduwe*; Goth. *viduro*; Ger. *wittwe*; L. *vidua*, a widow; Skr. *vidhava*, a widow]: a woman whose husband is dead: V. to deprive of a husband; to deprive of anything highly valued; in *OE.*, to endow anew with widow's rights that had been forfeited; to be widow of; survive as the widow of. WID'OWING, imp. WID'OWED, pp. *-ōd*: ADJ. bereaved of a husband by death; deprived of some good; stripped. WID'OWER, n. *-ēr*, a man deprived of his wife by death. WID'OWHOOD, n. *-hūd*, state of being a widow; in *OE.*, a widow's property or estate. WID'OWERHOOD, n. state of being a widower. GRASS-WIDOW (see GRASS).—A *Widow's* rights to dower extend, by the common law of England, to a life-estate in one-third of the lands and tenements of which her husband died seized, and which any issue that she may have had might by possi-

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bility have inherited, and the law of dower in the United States generally conforms substantially to this. There are certain modes of conveying and devising property so as to prevent dower arising; also a widow's right to dower is generally prevented by giving her a jointure. A woman loses her dower by a divorce, but not by judicial separation or by misconduct: see DOWER: JOINTURE: JUS RELICTÆ: MARRIAGE.

WID'OW-BIRD: see WHYDA H-BIRD.

WIDTH: see WIDE.

WIELAND, *wē'land*, Ger. *vē'lánt*, CHRISTOPH MARTIN: German poet and man of letters: 1733, Sep. 5—1813, Jan. 20; b. at Oberholzheim, near Biberach—his father being pastor of that place and afterward in Biberach. In 1750 W. went to the Univ. of Tübingen to study law, but occupied himself more with the classics and with recent literature native and foreign. He returned to Biberach 1752. At this time Klopstock's example had extraordinary influence on him, so that he gave himself up to a mystical piety, foreign to his nature, to which he gives utterance in the *Empfindungen des Christen* (The Christian's Experiences). While in this mood, an invitation from Bodmer induced him to go to Zürich. The episode from the *Cyropaideia* of Xenophon, *Araspes und Panthea* (about 1759), revealed W. in a quite new mood as the poet of love. In 1760 he received an appointment in Biberach in connection with the law courts. At this period he engaged in the difficult task of translating Shakespeare (8 vols. Zür. 1762–66).

W. now spent much of his time at Warthausen, near Biberach, the estate of the Count von Stadion, an accomplished man, but thoroughly averse to religious earnestness. Here W. became imbued with that modern French philosophy which runs through the most of his later writings. In some of these there is an unmistakable tendency to licentiousness, from which his personal life remained free; in many of them he has blended the Greek sensibility to outward impressions with the French love of pleasure into a graceful philosophy of life. The first production which bears the impress of this French-Greek sensuousness was the poetical tale *Nadine*. In 1766 and 1767, *Agathon*, a romance in 3 vols. (1766, 7), greatly extended W.'s fame. In the didactic poem *Musarion* (1768) he advocated a carefully balanced gratification of all legitimate impulses—which seems to have been his highest ideal of conduct. In 1765 he married a lady of Augsburg; and he accepted a call to Erfurt (1769), as prof. of philosophy.

A period of leisure and of undisturbed work began for W. when the widowed Duchess Anna Amalie invited him to Weimar (1772), as tutor to her two sons, with the status of Hofrath and a salary of 1,000 thalers. Here he wrote his vaudeville, *Die Wahl des Hercules* (The Choice of Hercules); and the lyrical drama *Alceste* (1773). Of greater importance for German literature was the publication of the *German Mercury*, a monthly periodical, for which W.

WIELD—WIELICZKA

wrote constantly for many years. His letters on his *Alceste* in the *Mercury* (1773, Sep.) show the tendency to the narrowness and shallowness of the French philosophy of that time, at which Goethe and Herder were so much offended. His prodigious literary productiveness showed itself notably in the *Geschichte der Abderiten* (History of the Abderites, 1773), a charming work, depicting the follies of small communities; in a series of tales and stories; in *Oberon*, a romantic heroic poem, the most perfect and enduring of his greater works (1780, last ed. Leip. 1853); in his transl. of Horace (*Letters*, 1782; *Satires*, 1786) and of Lucian (1788); and in his complete sketch of his conception of the Greek world in the *Aristippe* (1800). A collected edition of W.'s works to 1802 (36 vols., with 6 supplementary vols. in large quarto and large and small octavo—new ed. with the poet's life, 53 vols. 1828, 36 vols. 1839) was published in Leipzig. From the proceeds, W. was enabled to buy the estate of Osmannstädt, near Weimar, where he lived 1798–1803 in the circle of his numerous family. His *Attic Museum* (1796–1804) and the *Neue Attic Museum* (1805–09) were attempts to make his countrymen familiar with Greek poetry, philosophy, and rhetoric. In 1803 he returned to Weimar, where he died.

W. had neither the spirit of a reformer like Klopstock and Lessing, nor did he attain the poetical greatness of Goethe or Schiller; and he was not profound as critic; nevertheless, he did great service to German literature—giving to German poetry the still lacking grace and harmony of expression and versification. The school of romantic German poetry is indebted to him for its origin.—Compare, besides Gruber's *Biographie Wieland's* (4 vols. Leip. 1827; vols. 50–53 of the *Works*), *Wieland's ausgewählte Briefe* (4 vols. Zür. 1815), *Auswahl denkwürdiger Briefe* (2 vols. Wien 1815), and *Briefe an Sophie Laroche* (Berl. 1820); also Löbell's *C. F. Wieland* (1858).

WIELD, v. *wēld* [AS. *wealdan*; Goth. *valdan*; Ger. *walten*; Icel. *valda*; Dan. *volde*, to rule, to dispose of]: to use with full command or power that which is not too heavy or too difficult for the holder; to manage; to handle; to employ. WIELD'ING, imp. WIELD'ED, pp. WIELD'LESS, a. *-lēś*, unmanageable. WIELD'ABLE, a. *-ā-bl*, manageable. WIELD'ER, n. *-ēr*, one who wields. WIELDY, a. *wēld'ī*, that may be wielded; manageable.

WIELICZKA, *vē-līch'ka*: town of Austrian Galicia, in the dist. of W.; 10 m. e.s.e. of Cracow by railway. It is noted for its salt mines, in which many of the inhabitants are employed. The mines were discovered 1250, and have since been continuously worked. The town is entirely undermined by the excavations, which extend 9,600 ft. from e. to w., 3,600 ft. from n. to s., and are 1,780 ft. in depth. The mines extend to 6 stories or 'fields,' one below another. In the second story the visitor is rowed across a salt lake, and when he has reached and is exploring the third story, he is informed that the lake which he lately crossed is now right above his head. The stories are simply large chambers excavated in one enormous mass of

WIENER-NEUSTADT—WIESBADEN.

rock-salt of great purity, and apparently of inexhaustible extent. In one of the chambers the miners have scooped out a Gothic chapel, and skilfully carved a number of statues and obelisks, from the solid rock-salt. The mines produce 61,500 tons per annum. W. has a spacious market-place, a castle, a Franciscan monastery, a school of mines, etc. Pop. about 6,000.

WIENER-NEUSTADT: see NEUSTADT, or WIENER-NEUSTADT.

WIER, n. *wēr*: same as WEIR.

WIERY, a. *wēr'ī* or *wīr'ī* [Ger. *wehr*, a dam (see WEIR)]: in *OE.*, wet; moist.

WIERY: see WIRY (under WIRE).

WIESBA'DEN: district in Prussia; till 1866 (in large part) the duchy of Nassau (q.v.): see also HESSE-CASSEL.

WIESBADEN, *vēs-bá'dén*: chief town of the Prussian dist. of W., prov. of Hesse-Nassau (formerly the independent duchy of Nassau); one of the oldest and most famous of German watering-places; delightfully situated on the s. slopes of Mt. Taunus, 26 m. w. of Frankfurt, 5 m. n.w. of Mainz by railway. W. has been called 'a city of lodging-houses,' and during the 'season' the number of the visitors is greater than that of the residents. The town is well and regularly built. The *Kursaal* comprises, besides reading-rooms, etc., an extensive dining-hall which serves also as a ball-room. Other buildings are the *Schlösschen* (Little Palace), containing a library of 70,000 vols. and a collection of antiquities, in which are curious Roman *bassi-rilievi*, statues, altars, etc., found in the vicinity; a handsome Prot. church in Gothic style, finished 1860; the Grecian chapel, built by the Duke of Nassau as a mausoleum, in which the remains of his first wife lie; a Jewish synagogue in the Moorish style; etc. There are about 23 hot springs, all of high temperature, and numerous bathing-houses throughout the town; but the principal is the *Kochbrunnen* (Boiling-spring), the temperature of which is 156° F. The spring has all the appearance of a boiling caldron, and so copiously does it pour forth its waters, that, though they are used both for drinking and to supply the principal baths in the town, a vast quantity escapes, through gutters, sending up clouds of vapor in its passage along the streets, and adding to the warmth of the temperature of W. in summer. Next in heat and volume to the *Kochbrunnen* is the spring in the garden of the *Adler* (Eagle) Hotel, whose temperature is 134° F. The use of the W. hot springs is considered highly remedial for gout, rheumatism, scrofula, and skin diseases and nervous affections. The waters are saline, and contain silica and iron. W., with its beautiful situation and environment, and its unfailing gayety during the season, is one of the two most popular of the German spas (for the other, see BADEN-BADEN). The public gaming-tables were abolished 1872. The season is from June to Sep., and the number of visitors annually is nearly 60,000.—Pop. (1867) 30,085; (1885) 55,457; (1890) 64,670; (1900) 86,111.

WIFE—WIG.

W. is very ancient; its springs are the *Fontes Mattiaci* mentioned by Pliny. The Romans built a station here, and erected a fort on a hill on the n.w. side of the town, still known as the *Römerberg*, and which was garrisoned by the 22d Roman legion. The *Mattiaci*, a subdivision of the German tribe called the *Cutti*, allied themselves with the Romans; but in the 3d c., the barbarian Germans rose against the Romans, and destroyed their forts, including Wiesbaden. Urns, tiles, coins, etc., are found abundantly whenever excavations are made; and that the Romans appreciated the virtues of the waters is proved by the remains of ancient baths, and by the votive tablets recording the thanks of Romans who had been restored to health by the waters, still preserved in the museum.

WIFE, n. *wif*, plu. WIVES, *wīvz* [AS. and Icel. *wif*; Dut. *wijf*; Dan. *viv*; Ger. *weib*, a woman, a wife: in AS. the two sexes were distinguished as *weapned-man*, the weapon-man, and *wif-man*, the wife-man—*wife* being supposed to be derived from *weaving*—the *sword* and the *distaff* being taken as the types of the two sexes]: a woman united to a man by marriage; in *Scot.*, a woman, as *fishwife*, old *wives'* tales. WIFE'HOOD, n. *-hūd*, the state of being, or the qualities of, a wife. WIFE'LESS, a. *-lēś*, without a wife; unmarried. WIFE'LY, a. *-lī*, becoming a wife.

WIFE: see HUSBAND AND WIFE: MARRIAGE.

WIG, v. *wīg*: in *slang*, to censure severely; to scold. A GOOD WIGGING, a good scolding; a rating.

WIG, n. *wīg* [a contraction of *periwig*]: an artificial covering of hair for the head, intended to disguise the natural hair, or to make up for lack of hair; an official head-dress worn by judges, barristers, etc., in Great Britain. WIGGED, a. *wīgd*, wearing a wig. WIG'GERY, n. *-gēr-ī*, the hair of which a wig is made. BIG-WIG, a great person; a magnate. EARWIG (see EARWIG).—The use of *Wigs*, or coverings of false hair for concealing baldness or for the supposed adornment of the head, appears to belong to all ages and countries. There is an Egyptian wig in the Brit. Museum, supposed to be about 4,000 years old; and some of the South Sea islanders are said to be skilful wig-makers. Xenophon mentions that Astyages wore an immense wig. Several of the Roman emperors wore wigs, and Lampridius relates that the wig of Emperor Commodus was highly perfumed, and sprinkled with gold-dust. After this, there are no historical traces of the wig till about the end of the 14th c.; when wigs made their appearance in France, and gradually spread thence to other European countries. The fashion of wearing wigs became prevalent in the reign of Louis XIII. (1610–43), and for more than a century no gentleman of fashion could appear without one. Toward the end of the 18th c. the wig began to be superseded by the queue with Hair-powder (q.v.). Except by judges and barristers in England, wigs are now used only in cases of baldness, and they are made in imitation of nature, which was far from being the case with the wigs of old times,

WIGAN—WIGGLESWORTH.

WIGAN, *wĭg'an*: municipal and parliamentary borough of Lancashire, England; on the Douglas; 18 m. n.e. of Liverpool, 18 m. w.n.w. of Manchester, 195 m. n.w. of London by railway. Originally rather irregularly built, W. has rapidly improved in its streets and buildings. It is well sewered and liberally supplied with water. The parish church of All Saints is an ancient stately edifice in the late Perpendicular style, rebuilt in great part 1847. There are 21 Anglican churches and chapels, 9 Rom. Cath., and 21 other places of worship. W. stands in a coal-field, where cannel coal abounds, and is an important manufacturing centre. Cotton-spinning, the manufacture of calicoes and other cotton goods, checks, and home-made linens, are extensively carried on. There are also brass and iron foundries, factories for edge-tools, chemical works, paper works, and flouring-mills. The river Douglas and the Leeds and Liverpool canal afford facilities for inland navigation.—Pop. (1871) 39,110; (1881) 48,194; (1885) about 55,000; (1891) 55,013; (1901) 60,770.

WIGEON, n. *wĭj'ŭn*: same as WIDGEON (q.v.).

WIGGLESWORTH, *wĭg'glz-wérth*, EDWARD: revolutionary soldier: 1742, Jan. 3—1826, Dec. 8; b. Ipswich, Mass.; grandson of Michael W. (q.v.). He was commissioned as col. 1776, June; served as third in command of the fleet on Lake Champlain; returned to Newburyport, Mass., to raise a second regt. 1777; took part in the battle of Monmouth; and 1778 was pres. of a court of inquiry which investigated the surrender of Forts Montgomery and Clinton by Gov. George Clinton. He resigned 1779, and later was collector for the port of Newburyport, and 1818 received an annual pension of \$240 from congress. He died at Newburyport.

WIG'GLESWORTH, EDWARD, D.D.: educator: 1693–1765, Jan. 16; b. Malden, Mass.; son of Michael W. (q.v.). After graduating at Harvard College 1710, he studied theology, and held the Hollis professorship of divinity at Harvard from its foundation 1722 till his death. He became a member of the corporation of the college 1724. He was prominent in the Whitefield controversy, publishing *An Answer to Mr. Whitefield's Reply to the College Testimony* (1745), and *Distinguishing Characters of the Ordinary and Extraordinary Ministers of Christ* (1754). He served as commissioner of the London Soc. for Propagating the Gospel among the Indians, resigning 1755. Dr. W. was a man of learning, and his publications include sermons, lectures, and other religious works.

WIG'GLESWORTH, MICHAEL: clergyman: 1631, Oct. 18—1705, June 10; b. England. He came to New England with his father 1638; graduated at Harvard 1651; and was tutor there 1652–54, meanwhile studying theology. He held the pastorate at Malden, Mass., 1656 till his death, but was compelled to relinquish preaching 1663–85 on account of ill health. During this interval he studied and practiced medicine, resuming pulpit work in addition 1686. He declined the presidency of Harvard College 1684. His poem, *The Day of Doom, or a Description of the Great and Last Judgment* (1662), had great popularity, and reached 10 editions in this country (last ed. by William Henry Burr 1867): it vividly reflects the stern Calvinism of his day. Other poems of W. are: *God's Controversy with New England, written in the Time of the Great Drought, anno 1662*; *Meat out of the Eater, or Meditations concerning the Necessity, End, and Usefulness of Affliction to God's Children* (1669); and an elegy on the death of the Rev. Benjamin Bunker.

WIGHT, n. *wīt* [Dut. *wicht*, a child: AS. *wiht*, a creature, animal, person: Ger. *wicht*, a being, a wretch: Dan. *vætte*, an elf]: a creature; a man; a person; a human being.

WIGHT, a. *wīt* [Sw. *wig*, nimble: Icel. *vigr*, able to fight]: in *OE.*, active; swift; strong; brave. WIGHTLY, ad. *wīt'li*, in *OE.*, swiftly; nimbly; vigorously.

WIGHT, *wīt*, ISLE OF: island in the English Channel, noted for variety and beauty of scenery, and mildness and salubrity of climate. It forms part of Hampshire on the s. coast of England, and is separated from it by a channel called the Solent (q.v.), which varies in width from 1 to more than 6 m., and which spreads out to the e. into the broad and safe anchorage of *Spithead* (q.v.) and *St. Helen's Roads*. Its form is remarkably regular, its longer and shorter diameters (22 m. and 13½ m. in length respectively) running almost due e. and w., and n. and s. In shape the isle is rhomboidal, and has been compared to a bird with expanded wings or to a turbot. It is 56 m. in circuit, and, including its inlets, covers 98,320 acres. *Newport* is the capital; the other chief towns are *Ryde*, *Cowes*, and *Ventnor* (see these titles), of which the first and last have sprung up from small villages within the 19th c. *Yarmouth* is a small decayed town near the w. extremity of the island, and *Newtown*, on the n.w. coast, formerly an important town, is now an insignificant hamlet. On the s.e. coast, the delightful health resorts of *Sandown* and *Shanklin* have acquired the size and importance of towns. Railway communication has been opened between *Ryde* and *Ventnor*, and between *Cowes* and *Newport*. Throughout the island there are good though generally narrow roads, mostly picturesque and bounded by hedges. The chief physical feature of the island, to which it owes its shape and much of its beauty, is a long undulating range of chalk downs, extending from the *Culver Cliffs* on the e. to the *Needles* on the w., rising to its greatest elevation in *Mottiston Down*, 661 ft. (*Ashy Down* is 424

ft., and Bembridge Down 355 ft.) above sea-level. The river Medina, rising near the s. extremity of the island, flows n. through a gap in this range, expands into a tidal estuary below Newport, and flows into the Solent at Cowes, and divides the island into the hundreds or liberties of East and West Medina, excluding the two boroughs of Newport and Ryde. Another range of chalk downs of greater elevation—St. Boniface Down, 783 ft., Dunnose (Shanklin Down), 771 ft., St. Catherine's, 769 ft.—rises at the s. point of the island, and expands into a broad promontory, whose s. face forms the picturesque district known as the *Undercliff*, or 'Back of the Island,' of which Ventnor is the capital. This district owes its remarkable beauty to a series of land-slips on a large scale, of prehistoric date, which have laid bare a long wall of rugged cliff, below which a succession of sunny terraces, due to the gradual subsidence of the strata, slope gently down to the sea. This part of the island is completely sheltered from the colder winds, and is well suited as a place of residence for invalids suffering from consumption or any disease of the respiratory organs. Its remarkable healthfulness is attested by the official death-rate—the lowest in the kingdom; while the mildness of its climate is evidenced by the luxuriance of the myrtles, fuchsias, sweet-scented verbenas, and other exotics, which live through the winter without protection. The Isle of W. is a great summer resort, though the heat is sometimes great.

The geology of the Isle of W. is interesting. The great variety of strata displayed within so small an area, under circumstances favorable for examination, renders it one of the best available localities for the young observer. The n. side presents a succession of Tertiary or Eocene strata, including beds of fresh-water limestone, extensively worked for building-stone for many centuries, and based on beds of London and Plastic Clay. In Alum Bay, at the w. extremity of the island, the rapid succession of vertical layers of sand and clays of bright and varied hues, produces a singular and beautiful effect. The central ridge or backbone consists of strata of chalk imbedding layers of flints, and the underlying formations in an almost vertical position. Isolated masses of chalk that, in consequence of their superior hardness, have survived the marine and atmospheric waste, form the well-known *Needles*, at the w. opening of the Solent, and the picturesque rocks of Fresh-water Bay. The downs at the s. of the island belong to the same formation, but here the strata have been undisturbed, and are nearly horizontal. The cliffs of the Undercliff are of the Upper Greensand, or Firestone, underlying the chalk. Below this comes the Gault, or Blue Marl. To the action of the land-springs on this unctuous formation, the land-slips to which the Back of the Island owes its beauty are due. The Lower Greensand succeeds the gault, occupying the greater part of the area between the n. and s. chalk downs. This forms excellent grain-land, and presents a wall of cliff to the sea, diversified with many narrow picturesque gorges, locally known as *Chines*, where

WIGHT.

a small rivulet has eaten away the friable strata. The chief of these are those of Shanklin, Luccombe, Blackgang, and Whale China. The freshwater Wealden formation is the lowest visible in the island, and is seen in the cliffs of Brook to the w., and of Redcliff Bay to the e. Bones of the colossal iguanodon and other saurians are found in this formation.

The *soil* of the island is varied in nature and fertility. That of the n. half is, to a considerable extent, a cold, stiff clay, more suited for the growth of wood, especially oak, than of grain. Farming is still somewhat primitive; even on some large farms the flail is still in use. The soil of the s. half is chiefly a red loam, exceedingly productive, especially of barley, and, in the more rich and sheltered lands, of *white* wheat. *Red* wheat is grown in abundance in other parts of the island; while the stiffer clays of the n. grow excellent crops of oats. The chalk downs afford pasturage for sheep, famed for pureness of wool, and which furnish the London market with early lamb. The chief exports are wool, grain, flour, cement stones (septaria), and white glass-house sand. The principal communication between the mainland and the island is by steamboats daily between Portsmouth and Ryde, at both of which places there are good landing-piers.—Pop. (1871) 66,219; (1881) 73,633; (1891) 78,718; (1901) 82,388.

The *history* of the Isle of W. presents few points of interest. It is supposed to have been the tin mart of the Greek traders mentioned under the name *Ictis* by Diodorus Siculus. The Romans knew it as *Vecta* or *Vectis*, which is merely the Latinized form of the native name. It was conquered for the Romans by Vespasian in the reign of Claudius (A.D. 43). Cerdic, founder of the kingdom of Wessex, took the island 530, and transferred it to his nephews, Stuf and Wihtgar. In 661 it was reduced by Wulphere of Mercia, and given to Ethelwold, King of Sussex, from whom it was wrested (686) by Ceadwalla of Wessex, to whom, under the benign influence of Wilfrid, Abp. of York, the island owes the introduction of Christianity. During the three centuries preceding the Norman Conquest, it was repeatedly devastated by the Danish pirates, who made it their stronghold, to which they retired with their plunder. William the Conqueror gave it to his kinsman, Fitz-Osborne; Henry I. transferred it to the family of De Redvers, in whose hands it remained till the reign of Edward I., when it passed by sale to the crown. During the French wars of Edward III. and his successors, the island was repeatedly invaded and pillaged by the French. At the close of the reign of Henry VIII., the armada dispatched by Francis I., under command of D'Annebault, made several landings on the coast, and inflicted some damage, but was ultimately driven back by the prowess of the islanders. The most interesting event in the history of the island is the imprisonment of Charles I. in the castle of Carisbrooke, after his flight from Hampton Court (1647, Nov. 23—1648, Sep. 15). Carisbrooke was also the place of the imprisonment of his children,

WIGTON.

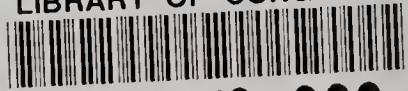
Prince Henry and the Princess Elizabeth, the latter of whom died there, and was buried in Newport Church, where a beautiful monument by Baron Marochetti has been erected to her memory by Queen Victoria.

The antiquities are not numerous. Sepulchral barrows occur on the downs, and Saxon burial-places have been discovered. There are the remains of a Roman villa, with a tessellated pavement, at Carisbrooke. The remains of Quarr Abbey, near Ryde, are very scanty. Carisbrooke Castle is a fine ruin, occupying a commanding position.

WIGTON, *wig'ton*: market-town and manufacturing town of Cumberland, England; in an agricultural district; 11½ m. by railway s.w. of Carlisle. It carries on manufactures of gingham and checks.—Pop. (1891) 3,836.

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